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A Popular Handbook of Physiology & Domestic Medicine

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MAN AND HIS MALADIES

OR

THE WAY TO HEALTH

A POPULAR HANDBOOK OF

PHYSIOLOGY AND DOMESTIC MEDICINE IN ACCORD WITH THE ADVANCE IN MEDICAL SCIENCE

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NEW YORK
HARPER & BROTHERS, FRANKLIN SQUARE
1889

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PREFACE.

It has been said that in every human heart there exists a recess, called by the French *le petit coin bleu*, where, safe from the besoms of reason and of logic, lie hid many unavowed beliefs.

Thus, that medicine is a science to be studied and applied on the same lines as its sister cults, the lips of humanity affirm; that medicine is a mystery, and its practice largely a game of chance, the attitude of humanity at large attests.

The most widely consulted books on popular medicine bear witness to this truth. An abstract principle to impart a philosophic tone; a list of the *names* of diseases—"the counters of wise men, but the money of fools," according to Hobbes—treated as representing each a fixed quantity, to give an appearance of precision; a formidable array of such animal, vegetable, and mineral compounds as can most surely set up some disturbance in the bodily economy, to checkmate with their movements what have been assumed to be the invariable and deleterious symptoms of unvarying, and essentially noxious, diseases; and we have a picture of the "Complete Pocket Physician" according to the popular idea.

It is the play of "Hamlet" without the Prince of Denmark; the science and art of medicine without man.

I have written this book in order to rectify the omission; in order to introduce man to the reader of popular medicine. I have ventured even to confer on him the leading *rôle*, have made him tell the story of his birth and growth, and explain the functions of, and the source of power in, that wonderful piece of mechanism, his body; to prove that he is not, as is calumniously asserted of him, the sport of malignant spirits in the guise of diseases; but the well-cared-for child of old Dame Nature, who leads him by what are called functional disorders, as tenderly and directly as is possible, back to the paths of health when he has strayed therefrom; and purifies, by organic disease, his race of those least worthy of it or least fitted to enjoy it.

In the close study of man and of his relations with Nature, and in a correct interpretation of the phenomena (the symptoms) attendant on his disorders, does, in my humble opinion, the Science of Medicine consist. Treatment is, then, not a combat—of which the battlefield is the patient's body — between a treacherous and potent enemy, disease, and a physician armed with chemical thunderbolts, but a partnership between Nature and her disciple working harmoniously together for the sufferer's good.

"Not as adventitious therefore," says the greatest of our modern philosophers, "will the wise man regard the faith that is in him. The highest truth he sees he will fearlessly utter; knowing that, let what may come of it, he is thus playing his right part in the world—knowing that if he can effect the change he aims at—well: if not —well also; but not so well."

16 Orchard Street, Portman Square, W.

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INTRODUCTION.

The art of healing is built on the science of medicine, as that of calculation rests on the science of mathematics.

The science of medicine deals with the relationship of physical law to the life and health of man.

CHAPTER I.

THE PRINCIPLES OF LIFE.

Human life begins in a germ-cell, which is an intricate compound of six elements; in its intricacy is to be found the source of its only energy, which, though small, is, in conjunction (under certain conditions) with that derived from soluble albuminous food, sufficient to account for the phenomena of life and growth. The colloid form of the germ-cell and its descendants renders them specially susceptible to the influence of matter and energy in their environment. The environment, plus inherited peculiarities of structure in the germ-cell, determine the form, and thus the nature and character, of man. The motor power in man, as in the steam-engine, is derived from the combustion of fuel. In completely formed man we have but one real system, the food-system, specialized departments in which are devoted to the guidance, the locomotion, and the reproduction of the body.

CHAPTER I.

THE PRINCIPLES OF LIFE.

"For dust thou art, and unto dust shalt thou return."—GENESIS.

IN kind organic or inorganic, man, as long as he is called man—from conception to disintegration—is but that which the Divine voice first described him—dust.

"You are dust," says modern science, "growing, moving, thinking, propagating dust, and your death is but the consequence of what you call life."

Let us, in this chapter, briefly study the facts on which these dicta of God and of science rest.

Man enters on life a *germ-cell*, microscopical in size, spheroid in shape, colloid in character; a chemical compound of six simple elements.

First we will discuss the six elements, and show that these, though of ordinary kind, are each possessed of some striking character, calculated *à priori* to make their union what it is, an eventful one, fruitful in surprises. The names of these elements are, hydrogen, oxygen, nitrogen, carbon, sulphur, and phosphorus.

Now, the first four of these offer at once a striking exception to the general rule, that all matters may exist as a solid, liquid, or gas, for oxygen, hydrogen, and nitrogen are known to us but in the gaseous form, while carbon is ever a solid. Then, five of our elements possess a protean character, for phosphorus may exist either as a yellow and

most inflammable solid, or as a red and singularly incombustible one; carbon, as the very different substances, plumbago, charcoal, or the diamond; oxygen, as simple oxygen or as ozone; sulphur is known in three distinct characters; while hydrogen is, with some reason, suspected of being the parent of all the so-called elements, itself the sole, final, real element. Then hydrogen, carbon, phosphorus, and sulphur possess, among elements, remarkably weak chemical affinities, the compounds into which they enter being marked, therefore, by instability; while nitrogen—as we know from our familiar explosives, of which it constitutes the essential ingredient, the *fons et origo mali*—is so fickle in its chemical unions that it flies away, a solitary gas, on the smallest provocation. So essential is this instability of nitrogen to life that the phrase "There is no life without nitrogen" has long since become a recognized axiom, to which no exception is known to exist, either in the vegetable or the animal world.

The atoms of the above six elements combined in large molecules of exceedingly complex structure* are the factors of the germ-cell. It is in this complexity of molecular arrangement that is to be found the key to the phenomena of life.

But in what way?

It is an elementary fact in chemistry that the more complex the molecule of a compound, the more prone is that compound to undergo change in the direction of simplification. In other words, a compound possesses, in proportion to its complexity, latent energy which prompts it to move in the direction of simplification.

Now, the human germ-cell is admitted by scientists to

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* These molecules consist each of several hundred constituent atoms.

be of such exceeding molecular complexity as to defy all attempts at giving to it a rational chemical formula. It therefore, pre-eminently among chemical compounds, possesses the energy of which I have spoken.

In itself, however, there is nothing extraordinary either in this energy or in its amount, for, exposed, alone, to the influence of the atmosphere, the germ-cell in a few days has spent its energy, lived its life, reached its goal, passed from complex organic to simple inorganic dust, without one striking phenomenon to indicate the passage, while this same germ-cell, if shielded from the air, surrounded with organic matter like to itself in stored energy, and supplied with the necessary conditions (warmth, moisture, etc.) to chemical action, could have grown and developed into a man.

Does the reader wonder at this statement, a dozen familiar analogies may be found.

Let him take a key and wind up one of those masterpieces of horological skill, a clock that indicates, for the space of a year, the seconds, minutes, hours, days, and months on its dial plates; in other words, let him transfer from the muscles of his arm, though unconscious of the loss thereof, to the steel clock-spring a certain amount of energy, sufficient, *provided other material* (*namely, the clock mechanism*) *be suitably adapted thereto*, to maintain, for a very long period of time, all the complicated clock movements in regular order. Let him also expend the same amount of force on an unattached clock-spring, and in a few seconds, and with but trifling movements, the spring lies before him uncoiled and forceless, though precisely the same energy has been expended in both instances and on precisely the same material.

Is it not thus with the germ-cell? It is prepared in a human body, stored with but such a fraction of the total

bodily energy that the loss is unfelt by its bestower, and yet is it sufficiently endowed, *provided the material necessary thereto be brought in contact with it*, to perform all the functions that appertain to life, the cell having, moreover, this enormous advantage over the clock-spring, that the material on which it acts, itself brings to the production of the phenomena witnessed vast stores of energy in the organized material from the bodies of the plants and animals used as food?

Let us now turn to the character of the germ-cell. I have called it a *colloid*. What means this word?

All solid matter presents itself in one of two forms, the crystalloid and the colloid, each form possessing a certain *raison d'être* and certain characteristics, of which we will discuss those that bear upon the life of man.

The *crystalloid* is a firm solid. Its shape may vary infinitely. Its growth is by accretion—*i. e.*, by its surfaces only, for these alone are affected by its surroundings—and is without fixed limit. It is a compound of comparatively simple molecules, the atoms of which have for each other strong affinity. It is more or less soluble in water. The crystalloid is the form of nearly all inorganic matter.

The *colloid* is a jelly. When not subject to compression, it assumes a *spherical outline;* it is *permeable* by water containing dissolved crystalloids in solution; it can grow, therefore, by increase in size of its constituent parts, as well those internal as those external, and it may therefore, *throughout its whole thickness, be influenced by its surroundings.* Its limit of size is, in the more complex colloids, *fixed*, increase in total size being therefore accompanied by *the appearance of fresh spherical colloids*, for its constituent parts, always many-atomed molecules, have for one another but feeble chemical attraction. It is *rarely*

soluble in water. The colloid is the form of all living organic matter.

In the colloid character of a germ-cell we have an explanation of its growth. At conception it is encased in crystalloid food;* give it but moisture to dissolve the crystalloids and carry them to its innermost molecules; give it heat favorable to all chemical change, and the fact that in a few days there is no longer one single germ-cell, but a number of closely packed similar cells, is no longer inexplicable; continue the process by first supplying dissolved crystalloids from the maternal blood, and later on, during extra-maternal life, from the once-living parts of plants and animals, and you have the principle and the secret of *growth.*

But what, the reader may inquire, about the phenomena of life? The interaction of cell and cell-food accounts for the building of the perfect mechanism, the combustion of fuel, as we shall presently see, for the exhibition of all other varieties of so-called vital force.

Let us here draw attention to a fact already mentioned —one that has a great bearing on the question of human life. The growth of the cell-colloid takes, as we have seen, of necessity, the form of a multiplication of cells. From this, at first sight, we might be led to think that each cell was, in some measure, an independent being, and not really an integral part of the whole; but this is not so, for dissolved crystalloids pass on from one cell to another just as they would through one vast single cell, each cell having only an outline, its several parts being only held together by attraction, and not, as was formerly supposed, by an encircling wall converting each into a separate being. Man is not, then, what at first sight the

* Or food convertible readily by heat and moisture to the crystalloid form.

microscope might seem to prove, a species of colony, but a single individual composed of many cells, each of which is an integral part of the whole being.

To sum up: A germ-cell *grows* because it is permeated by dissolved crystalloids, with which its molecules can form unions, the powers of movement, thought, etc., possessed by all higher animals after a certain stage of existence is reached, being distinct processes dependent upon the heat energy evolved in the combustion of certain articles called fuel-foods.

Having now discussed the manifold properties possessed by the constituent elements of a germ-cell, their elaborate molecular arrangement, and the peculiar facilities offered by the colloid form to the action of crystalloid material in solution, we may devote a few pages to the rationale of the development, life-history, and death of the human body.

The Environment of the Germ-cell and of its Progeny.

The germ-cell, independently of its environment, is, as we have seen, of the most trifling importance; it is on the adaptability of this latter to the stored energies in the cells that growth, life, and development entirely depend.

Growth, we now know, is the result of chemical union between the molecules of the germ-cell (and of its progeny) and certain dissolved crystalloids brought to them. These crystalloids must, however, be of one special kind, and approach, in the nature and variety of their elements and in their complexity of structure, closely to the cell or cells with which they are to unite, for, were they of simple inorganic kind, it is clear that the passage from the molecular complexity of a living cell to the simplicity of inorganic molecular arrangement would be sudden and quick,

and that, in consequence, life, instead of extending over many years and being rich in phenomena, would come to occupy but the space of a few days, hours, minutes, or even seconds.

Whence are such necessary crystalloids to come? From the living bodies of animals and plants, whose colloid cells, changed by a process called digestion to crystalloids, and dissolved in water, are carried from the first to the last moments of life to the living cells of man to act as his food. Prior to birth, these necessary substances are supplied already digested by the maternal blood-stream; after that period man has to digest them for himself, his blood, however, always keeping, in the form of serum, *a reserve stock* on hand, which does not fail, provided only water be supplied, for many days, even when no food whatever is consumed.

Let us now turn to development.

The germ-cell, though single, is compounded of the union of two cells, one from a male and the other from a female,* and as each of these is, as is every cell in a living body, an integral part of the whole structure whence it came, sharing with all its other cells in the common food-supply and the special peculiarities of the body, it is scarcely a matter of wonder that the human offspring, which is but a developed germ-cell, should bear a structure and a character which are blends, in varying proportions, of those of its two parents.

The peculiarity of structure transmitted by the parents is thus the first great determining factor in development, and the second and only other is the influence of the environment. To turn for a moment to a practical example: a specially unfavorable environment may produce gout (or

* It is probably the union of the two which *starts* the chemical processes of growth and life.

any other peculiarity) in an individual free from any hereditary taint, while a specially favorable one may keep the disease at bay, though the structural tendency thereto may have been strong in the germ-cell.

The *environment* of the germ-cell and of its offspring then include the following :

In the first place, food, *i. e.*, tissue-food, technically called albumen, derived from the organic parts of animals and plants, and, after digestion — which is synonymous with conversion to the crystalloid state—presented to the cells. In the next place, all other forces in Nature which have an influence on the rate and direction of cell-growth. Of these, fuel-food is, of course, one of the principal, the others being certain conditions of air and temperature favorable or the reverse to a due activity in the cells or in certain of them, the nature and extent of the life-work, the influence of improper articles of consumption, all of which, with the host of other influences, direct the course of the cell-growth—in other words, mould the man.

As we shall see in the next chapter, it is on the adaptability of the environment to the cell powers that health depends, an imperfect adaptation inducing the phenomena of ill-health, a failure of adaptation involving *death*.

And as the body grows older death must become nearer, must, other things being equal, be more easily induced, for the growth power originally possessed by the germ-cell, and now spread over all its family, approaches day by day nearer to exhaustion. At conception its action is rapid, doubling, but always with increasing intervals, the body weights ; in middle life it but suffices to enable the cells to hold their own ; in old age even this mere repairing power dwindles. As it is on this store of energy, on this growing and repairing power, that life depends, so it is on its extinction, either by premature destruction of the body

or as the result of a natural exhaustion, that death must ensue.*

We have so far discussed the questions of growth and development; we now turn to the discovery of the source of motive-power in the body of man. This cannot be included in growth, for the processes I have described so far account only for the building up of the body, the making of the mechanism in which, as in a steam-engine, fuel may be burned so as to produce movement.

The fuels used by the body of man are of two kinds, fats (hydro-carbons) and starches or sugars (carbo-hydrates). These are called fuel-foods, and the *sole* end in their consumption is the production of heat-energy. By what process is this effected?

Consumed generally in colloid form, fuel-foods are converted by digestion to crystalloids, which, by means of the fluids in the body (the origin of which is the water we imbibe), are carried through the stomach and intestinal walls into the blood-current of man and away to his cells. Here they are oxidized by means of the oxygen in the blood-currents, the products of the process, carbonic acid and water, being expelled by the lungs, skin, and kidneys, the heat-energy evolved being stored in the cells to provide

* That the principles of growth and life are what I have stated, phenomena attendant on a series of chemical actions between living cells and certain foods, is rendered all the more convincing by the fact that, in certain lowly forms of existence, life may be arrested, even in the presence of food, by dryness and cold (warmth and moisture being necessary for vital as for nearly all chemical processes), and may be resumed, after a long lapse of time, at the point where it left off, upon the supplying of the two requisite conditions. That this state of suspended animation cannot be reproduced in man is, we may fairly presume, due to the great complexity of his structure and the difficulty of applying simultaneously to all parts the conditions necessary thereto.

the body with all its necessary movements. "Observe," says Sir W. Armstrong, in comparing the body to a steam-engine, "how superior the result is in Nature's engine to what it is in ours. Nature only uses heat of low grade, such as we find wholly unavailable. We reject our steam as useless at a temperature which would cook the animal substances, while Nature works with a heat so mild as not to hurt the most delicate tissue. And yet, notwithstanding the greater availability of high-grade temperature, the quantity of work performed by the living engine, relative to the fuel consumed, puts the steam-engine to shame."

We have now finished our task—the brief discussion of the *principles* of life; and have made out a case for the literal truth of the text which heads this chapter, and which we set ourselves to prove. From conception to final dissolution man is never anything but dust, for a short time a complex, organic dust, possessed, under certain conditions, of building power, and, supported by the energies of fuel-foods, evincing the signs of life, at last simple and powerless because it has reached the general low level of inorganic matter.

But the body of man being of the nature of a machine designed for motion, and being worked, like most of our machines, by heat-energy, it is necessary, ere we close this chapter, to show in what way his organs are ranged to fulfil the necessary purposes of machinery, more especially as that arrangement is not at first sight very clear. We may, then, class the organs thus into systems:

The Food System.

(*a*) Organs concerned in food reception: the mouth, stomach, and intestines.

(*b*) Organs concerned in food digestion—in the conversion of colloids to crystalloids: the mouth and its glands,

the stomach and its glands, the intestine and its glands, the liver, the pancreas.

(*c*) Organs concerned in pumping and conveying food to the cells : the heart, arteries, and capillaries.

(*d*) Organs concerned in the conveyance away from the cells of waste products : the capillaries, veins (except the portal vein), the lymphatic spaces, glands, and ducts.

(*e*) Organs concerned in the ejection from the body of the waste products of combustion or other chemical process : the kidneys, urinary bladder, liver, skin, and lungs.

The bowel may be included under this heading, though its function is very different to that of the organs just named, for it ejects from the body material unsuited to its nourishment, and all food in excess of the digestive capacity, material that has never entered the blood-stream at all.

(*f*) Organs concerned in the supply of oxygen : the lungs.

(*g*) Organs concerned in the conveyance of oxygen : the red-blood corpuscles, the arteries, and the capillaries.

In the above list we have, in the recurrence of some organs—*e.g.*, the liver, the arteries, etc.—under more than one heading, an instructive example of the economy practised in the human body. Man is thus not only a machine, but the best example we have of a perfect machine, one in which every particle of energy is utilized to the fullest extent. This perfection, say the evolutionists, is the necessary outcome of the fierce struggle for existence on this globe, the survivors being those fittest, by reason of a greater structural perfection, to live, and these transmitting onwards their special characteristics.

The Nervous System.

(*a*) Organs concerned in storage of nerve force : the nerve cells.

(*b*) Organs concerned in the transmission of impressions to or from nerve cells : the nerve fibres.

The nerve cells are probably batteries, the electrical energy which they store being derived, by conversion, from the heat-energy evolved in the combustion of fuel foods. The impressions from the outside world, and those from the interior of the body, travelling along sensory or afferent (*ad*, to, and *fero*, I carry) nerves to the cells, cause an emission of electric energy along the motor or efferent (*e*, from, and *fero*, I carry) fibres which pass from each cell, and thus give rise, by means hereafter to be more fully described, to the various movements of the body or to the necessary secretions and muscular movements of internal organs.

All the reins, so to speak, of this great guiding system, are gathered up within the brain, in the hands of what may be styled the driver, the "control centre," there, the seat of what De Balzac, in one of his philosophical treatises,* calls the *vouloir* and the *pouvoir*. Nevertheless, even this supreme ruler depends, as abjectly as does the lowliest of body-cells, for the performance of its high function, on the perfection of the alimentary system of supply.

The Motor System.

(*a*) Organs concerned in the storage of heat-energy : the cells of the body.

(*b*) Organs concerned in locomotion : the bones, joints, muscles, tendons, and ligaments.

The principle employed in the movements of the limbs is that of the lever, the joints act as *the fulcra*, the limbs as *the weights*, and the great masses of elongated cells called the muscles, supply, by their contraction, *the power*.

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* "La Peau de Chagrin."

The Reproductive System.

About this system it is only necessary at present to say that, alone of all the systems, its exercise is not necessary to perfect health. In fact, this system belongs to the race rather than to the individual.

On reviewing my very brief outline of the systems, one is struck irresistibly with the prominent place occupied by the alimentary one. In point of fact, it is *the only real* system, the nervous, motor, and reproductive systems being but specialized branches of it, that convert and utilize in various ways the forces it supplies.

To conclude, in dealing with what has always been viewed as the mystery of life as explicable on a physical basis, and in tracing the rationalia of its phenomena, I must not, because I discard such phraseology as "the laboratory of Nature" and "the vital flame," vague, meaningless, and pseudo-reverential terms, with which popular books on man so frequently teem, be held to favor what is called a materialistic, an atheistic, view of creation; for let science do what it may, let it even create from inorganic matter living forms, still all that it could then claim would be that it had put together symbols—matter and energy—to form more compound formulæ, more active matter, without being able to explain the essence, the nature, or even the existence, as such, of the materials with which it had worked. Human reason would still have to face that enormous chasm which separates its little knowable from the vast unknowable, over which faith, resting on Divine inspiration, must still, and ever, reign supreme.

CHAPTER II.

THE PRINCIPLES OF HEALTH.

Health, a state of unstable equilibrium between the body of man and his environment, in some striking points comparable to the rhythmic movement of clockwork. Since all men differ in structure, no one set standard environment can exist for all. As there is no essentially perfect environment, so can there exist no essentially evil one. Within certain limits, and provided the change be gradually effected, the human body can adapt itself to new "aggregates of force." Examples of this. Conclusion.

CHAPTER II.

THE PRINCIPLES OF HEALTH.

"In every aggregate having compound movements, there tends constantly to be established a moving equilibrium, . . . and the standard reached must be one presenting an arrangement of forces that counterbalance all the forces to which the aggregate is subject."—HERBERT SPENCER.

"Jupiter, c'est la nature et le système qui la conduit. Ce système a pour but de tenir tout en mouvement et cependant tout *en équilibre.*"—ED. AUBER.

THE above two quotations contain not only the key to the definition and to the easy comprehension of the condition called health, but, when subjected to careful thought, will be found later on to furnish us with a standpoint from which we can discern the land of scientific and natural medicine.

We have finished with the question of the construction of man, and henceforth we have to regard him as a complete being, a single entity. Apparently a country of innumerable independent cells, in reality rather one huge cell divided into numerous parts, each one of which is in more intimate union with all the others than are the portions of even the most homogeneous solid; the cells themselves aggregated in groups or organs by reason of that external and internal moulding through which in their earlier history they have passed, each group differing consequently from other groups in structure, and therefore perforce also in function—which in all chemical compounds depends on structure—we have represented in this composite being an

embodiment of different forces, latent chemical force, their heritage, in his cells, and acquired heat-energy derived from the combustion of his fuel food.

To avoid the cumbrous idea of such an embodied mass of ever-varying quantities and arrangements of force, we may conveniently adopt Mr. Herbert Spencer's phraseology and speak of it as the "aggregate of forces" in the body. In the same way may we, in one single expression, sum up the forces of Nature — those resident in food, air, etc.— which can act on the body, speaking of them as the "aggregate of forces" in the environment.

Health consists in the existence of a state of unstable equilibrium between these two aggregates.

The term *unstable equilibrium* may, in the case of readers who are not familiar with this term in physics, be best explained by an example from every-day life, that of the pendulum.

A pendulum is set and kept in movement for a fixed period of time by the expenditure of a small amount of energy derived from a coiled steel spring, or a slowly falling weight, and oscillates rhythmically about its position of stable equilibrium, maintaining the clock mechanism, to which it is attached, in regular action. This is an example of unstable equilibrium; the pendulum is, as it were, constantly seeking to come to rest in the position of stable equilibrium (that assumed by it when the clock is not going), and is constantly, but with great regularity, overshooting the mark, by reason of the energy resident in the mainspring or elevated clock-weight.

It is precisely thus with man's body. The energy that maintains in it those rhythmic, regular movements of health which are essential to life—breathing, heart-pulsation, etc. — and which correspond to the oscillation of the pendulum, is derived from the latent energy in the

body cells which acts on it, and in the energies resident in food, etc.

In some of the lowliest forms of life, for example, in some fever germs, we may witness examples of the existence of a *stable* equilibrium between the two aggregates of force. In such cases there results a suspension of life, animation being only resumed when an increase in heat, moisture, or other environing force, again disturbs the absolute stability of the balance and restores the vital phenomena. In hibernating animals we witness a near approach to the same state.

Mr. Herbert Spencer calls unstable equilibrium, as witnessed in human beings, "moving equilibrium," a term which he makes to include more facts, but still all under the one and same principle.

In the case of various clocks, it matters not a jot, as far as the main object of clockwork is concerned—the correct indication of time for a certain period—whether the pendulum be large or small, heavy or light, or whether its oscillations extend over three or three dozen inches. It is also so with man. As regards his health, the question of muscular strength, of girth of chest, of size, has naught to do with health, the sole test being *the adaptability of the body to continue under the circumstances of life in which it is placed* — i.e., *under its environment* — *in those regular rhythmic movements which are most conducive to a long life.*

It follows as a necessary corollary that there can be no general arbitrary standards such as our one-idea men are so fond of assuming, no one perfect diet, no one perfect mode of life, no one fixed amount of ozone in the air, which would, had man but the grace to follow their wise counsels, regenerate mankind, and make all men healthy, wealthy, and wise ; and that no one fixed combination of

these would, or could, ever suffice to that end; and this simply because, as no two men coincide precisely in construction and in the amount, variety, and distribution of forces within the body, no one set of conditions can possibly be adaptable to the whole mass of humanity.

I used to wonder at one time why Providence was so unkind to the very amiable, but usually in general matters a little myopic, theorists, diet-men, teetotallers, faith-healers, anti-tobacconists, hygienists, etc. One read their books, their arguments seemed powerful, but the success anticipated did not somehow attend the adoption of their principles. Now we know the reason of this. These limpets had grasped the rock of knowledge, but covered only a portion of it with their shells, refusing to believe that there existed anything beyond that narrow boundary-line.

To return to our subject. We have thus two "aggregates of forces"—in other words, two compound bodies—each possessed of many different forms of force, the one the human body, the other the environment of that body. The first has to undergo moulding, the second is the mould, or, to speak more correctly, both modeller and mould.

The peculiar plasticity of the human body, its adaptability therefore to undergo change of form, and even of internal construction, in obedience to *force majeure*, acting in the nature of a mould on both the interior and the exterior of its constituent cells, we have studied in the last chapter. The structure of the mould is familiar to all of us; it is both many-sided and infinite in the variations of force exerted by its different parts. Food, light, air, sound—in short, contact with multiform bodies of inconstant shape, density, and power, acting sometimes in one way and with one intensity, sometimes in a precisely opposite manner and with greater or less force, sometimes

affecting one part of the body, sometimes another, and sometimes acting simultaneously and with equal pressure on all sides. Such is the environment, the mould of man.

I will give an illustration of my subject. Some years ago a medical scientist of no mean repute invented a machine that registered almost everything a man ought to do —how deeply he ought to breathe, how often and how rhythmically his heart ought to beat, what ought to be the amount of power in his biceps, how much he ought to weigh, and a host of other things. Two friends of mine, of nearly equal age—the one a young medical man of Highland parentage; the second, in the same profession, but born within the sound of Bow Bells—submitted themselves to this machine, which was to tell them, barring unforeseen circumstances, such as violent death, etc., their chances of life, and their actual existing state of health. The Highlander's state of health was declared to be of the finest, and nearly a half-century of life was presented to him by his mechanical judge, while the poor Londoner was practically sentenced to death, and that with such promptitude that one felt prompted to suggest to the delighted scientist—he was delighted with the perfection of his machine; he did not seem to notice or care much about the effect on human feeling of its awards—that an additional mechanism by which in similar cases a small black cap might be assumed by the machine would be a suitable and, for the onlookers, even an attractive, addition. Both my friends remained in London, and worked under similar conditions. The Highlander contracted phthisis and died in a little over a year; the Londoner lives, and is contemplating marriage instead of burial.

This, the reader may say, was a coincidence. Unfortunately, examples of its being a general law are forthcoming in plenty. When the vigorous mountaineer enters the

police force of Glasgow or London he runs a chance of dying—generally of consumption, the death of the weakling—infinitely greater than does the puny "Glesca chappie" or Cockney, who has such difficulty in passing the doctor. The Highlander has a splendid physique, but a physique which demands certain conditional surroundings. The relatively impure air of large towns acts as a poison on him; the contrast is too great for his body; no balancing is, in many cases, possible, and the Highlander simply succumbs, and the more vigorous he is, the more swiftly and surely, other conditions being equal, will he fail and die. If a change of environment has to be made, it should be made gradually, so that the strain thrown on the body in its effort to balance should be spread over as long a time as possible, and thus that its effects may be modified; for, as we shall see in the next chapter, if a body cannot balance the incident aggregate of forces in obedience to physical laws, it must undergo certain retrograde changes which jeopardize its life.

That which is seen in the case of the Highlander is witnessed equally when the town youth suddenly changes to a cold mountain climate. If his body be not capable of rapidly balancing the altered forces with which it is brought in contact, he will either die himself, or, if mated with a woman of similar constitution, be unable to perpetuate his race; for the failure to balance, when but slight, is manifested in the descendants. We have examples of this in Anglo-Indians. They are often picked men, and their wives are, as a rule, specimens of vigorous British womanhood, and yet the children are weak and puny, and the country cannot be colonized. Even when the Englishman intermarries with the native race the resulting progeny is not as well fitted to fight the battle of existence as is the native youth, though physically the

half-caste is generally much the better man; but physique — the common ideal of physique — has, as I have said, nothing to do with health unless it happen to be in balance with the general average conditions of life of the individual.

But in nothing better than in disease are we furnished with striking examples of the power that the average man of a country possesses to balance the average forces thereof. The Englishman scarcely dreads measles; it has for centuries been so familiar a disorder as almost to constitute a factor in the aggregate of forces of his environment; in fact, is one, to an extent proportioned to its frequency, and it was naturally thought, and therefore confidently asserted, by him—for he judged only by his own experience, as we all do—to be a comparatively harmless disease, caused by a bacterium of feeble power. But when carried by an English ship to the Fijians, it became to them a fatal and malignant scourge. This result gave rise to the penning of much scientific nonsense. One man said that this was so because the Fijian was black; another, because his climate acted as a kind of hot-house for the bacterium; others saw the causation in faults in his dietary; while one or two ecclesiastics developed the idea that, with the British missionary, God had instituted the European moral code in Fiji, and that the appearance of this scourge was designed by Heaven to show the native that the Almighty would not, now that he had means of enlightenment, tolerate his little "goings on" with impunity. However, as Christian blacks died in the same ratio as their heathen brothers, the latter theory had to be dropped, lest the profane might have argued from it that Christianity was not, in divine eyes, such a great improvement on the moral *status quo ante*. The real cause of this unexpected virulence of a mild European disease lay in the

simple fact that measles represented to the Fijian man's body a force which he had no means of balancing, it being utterly unlike any force to which it was habituated. There is thus in these diseases no *rigid standard of virulence*, everything depending upon the special adaptability of the body. It is thus with scarlet fever and with small-pox, whose violence, without any reference to sanitation, is infinitely greater among black races than with us. There are cases on record where the black races have returned us this compliment. Cholera has several times visited our shores, and proved more fatal to those attacked than is the same form of cholera (for there are at least two varieties of cholera) in India. It is true there is not such a very great difference in the death-rate as in small-pox, but it must be remembered that cholera is a disease not quite new to us, and that, even in so-called English cholera, we possess a form which, if not due to precisely the same genus and species of bacterium, may reasonably be viewed as conferring on us some immunity, and thus placing our case and that of the black races more on a par. Syphilis, the most fatal of all scourges, is believed by most authorities to have come to us from the New World. It certainly first showed itself in Europe shortly after the return of Columbus from Hayti in 1493, and its ravages in Europe were terrible. Even if not then imported from America, it was a new disease in France, England, Spain, Italy, and Austria, and consequently the death-rate from it there was enormous. In Spain and Portugal it is now a mild complaint, while even in England it is rarely or never fatal in its primary stage, as it used commonly to be when first imported. Yellow fever again is infinitely more fatal to the European, especially on his first arrival in the West Indies and in tropical South America, than it is to the black races resident there. Innumerable in-

stances, all proving the rule that this capacity of the aggregate of forces in a man's body to balance the aggregate of the forces in his environment is the sole test of health and the great guarantee of life, could be given; and proofs that the mind of man is subject to a similar law might also be adduced, but I have said as much as my space permits of, and sufficient to prove my contention.

But, may object a dissentient, how can my body, or the forces therein, balance the virus of small-pox, considering that neither I nor any of my predecessors for many generations have had it? To such I reply that this disease has existed in Europe for some hundreds of years, and that if the dissentient could trace back his descent for that period, he would find that out of his few millions of ancestors—direct and collateral—there will be found very many who have suffered from it. The human race is all more or less related, and the nineteenth-century man, as regards his bodily structure, and therefore also as regards its functions, is really a blend in varying proportions of the innumerable bodies of which he is the descendant. If, therefore, small-pox has been for long absent from the immediate predecessors of a man, he runs a great chance of contracting it unless he has been vaccinated—*tace*, O anti-vaccinationist! I have something to say both for and against you, by and by—and if he take it, he will probably suffer from an attack which, if his body be not in general good order, may very likely kill him; but still his risk will be less than that of the negro, and that because the white man's not very remote ancestors have suffered from it, whereas the negro is not thus protected, or, in any case, not to a similar extent.

It is undoubtedly to the genius of Darwin that we are indebted for the most complete working out of the action of this law of correspondence between a body and its en-

vironment, though Darwin unfortunately did not attempt the extension of it into the realms of disease; and it must be remembered that, although many disagreed with his conclusions, because they considered that these went beyond the logical power and scope of his premises, yet no one called in question his premises, the innumerable examples he cited of the effect of the surroundings on a structure; indeed, to have done so would have been to deny the truth of every-day experience, and to render impossible the descent of mankind from a single pair of human beings, as related in the Bible. How else could the Chinaman, the Papuan, and the Englishman have had a common pair of ancestors if the effects of their surroundings had not, since the creation, had a most potent effect on their bodily constitution? We are, of course, not concerned in this discussion with the origin of man, or the genesis of species; we have only to deal with this compound being, the man of to-day, and to view in his immediate surroundings the moulding process constantly at work.

Beware, then, of idealists, beware of standard-mongers. The sole test of health is the power of any given human being to balance the aggregate of the forces with which he may come into contact. Remember that you are what you are, because of the effect on you and on your predecessors of a certain environment, and because you are literally, as I explained in the first chapter, a grown-up portion of a father and mother, who each in their turn were integral portions of their parents, and so on back for innumerable generations.

It is almost certain that, for the same reasons as those which I have already given for the larger mortality attendant on a disease new to a people, as compared with that witnessed in the races accustomed to it, second at-

tacks of a specific fever are rarely witnessed in the same individual, or if a second attack occur, that it is so much lighter than the first. Of course there are other factors concerned in some cases; a body may, for example, be so imperfect as not to be able to balance the most ordinary forces, and, moreover, the special development of the bacterium and many other considerations must be taken fairly into account.

The beneficial effects of change of air on a sick person afford us yet a further and familiar evidence of our law. Is it not a fact that the tired-out London clerk or waiter often gets well more quickly in his native air? How often do doctors smile, how often have I not myself smiled, at this apparently silly conceit, this, as I judged, superstitious belief in native air; and how often have I not had to confess that it *did* seem to possess some peculiar virtue? The solution of the problem is easy. The part of the country where an individual was brought up, and which his forefathers had inhabited, is the part the conditions of which the deranged body of the patient is likely to most easily balance, and balance is health. It does not matter a fig if the part be not mentioned in the official catalogue of health resorts, or even if from any peculiarity, owing to which its climate has failed to come up to some artificial standard of moisture or of ozone, it may have been placed in the "Index Expurgatorius" of the climato-therapeutist, provided the patient's fathers enjoyed good health and long life there, and that he himself was well while living there, it may generally with the utmost confidence be recommended to him if his health has been deranged from any one of the ordinary effects of a town life.

Let us finally bring together the threads of the argument.

Health consists in the existence of a state of balance

between man and his surroundings, the special conditions of his existence. Man possesses the power of altering his environment, and, provided he inherit a fair structure from his parents, the alterations be made gradually, and his body be fairly rich in its inherited energy—the vital cell energy—in other words, provided he be young, the body will become moulded to its new conditions, will rearrange automatically its forces so as to meet such new conditions, without anything more than the most trifling, and often quite unnoticed, disturbance.

But these simple facts, so universally acknowledged and so confirmed by every-day experience as to seem to render quite superfluous their formal annunciation, are, while in theory held, in practice discarded by the majority of physicians. Not in the study of the forces and powers of the individual and of those which enter into his special environment—not, as we should expect, in the careful weighing and balancing of the one set against the other to discover in what direction the lack of adjustment is to be sought, and how it may, by readjustment, be rectified, does medicine pride itself, but on a silly, long since exploded, and pride-begotten theory that man is the pet and spoiled child of the earth ; that everything is more or less created for his pleasure and his good; and that, if these latter desiderata are not obtained by him, as evidently they are not, it is simply because in plants, in animals, and in minerals, the pearls of great price, the heaven-sent antidotes to his maladies, his pains, and his torments, have not yet been discovered. With redoubled vigor is the research pushed, every new chemical compound, every untried vegetable extract, every fresh emulsified and digested animal compound, nearly all utterly foreign to his bodily needs, and therefore worse than useless—even directly harmful—to his organization, all have to be made

trial of, and when, to rid itself of these antagonistic, because unusual and unutilizable, forces, the body calls up its reserve forces to expel the intruder, by the perspiration, the urine, the saliva, or the bile, a pæan of joy rises from the therapeutic choir, and a new weapon against disease is enrolled in the official catalogue. What a travesty of science! What a reversal of the common dictates of our reason! A beneficial process (for, as we shall see in the next chapter, disease is a benefactor) is first mistaken for an evil, and then a second and real evil is, as a general rule, introduced, in the hope that in its expulsion the first intruder may share.

But this is not the place to discuss the absurdities with which the principles of medicine, when it deigns to give any indication of the possession of any intelligible principles, abound; the question of equilibrium of health has so far alone demanded our attention, while in the next chapter, and ere we can come to the practical questions of treatment, we must seek to interpret correctly the significance of what is popularly styled disease.

CHAPTER III.

THE PRINCIPLES OF ILL-HEALTH.

Ill-health consists in a disturbance of the equilibrium of health. The disturbing force may be slight and the process of re-equilibration (*i. e.*, *functional disorder*), in consequence, short and restorative of the old state of balance; or more powerful, and partially destructive of the body (*i. e.*, *organic disease*), with one of the following results: either the re-establishment of an imperfect equilibrium (*chronic ill-health*), in which the rhythm of health is, more or less, wanting, and which must, except under special conditions of environment, end in premature death; or the more or less sudden, complete, and permanent overthrow of all equilibrium (*death*). The symptoms of disease are always beneficent, are the visible effects of the excess (the disturbing) force expending itself on the body in the direction of the least resistance. Drugs may deflect the direction taken by this force, or may cause the part attacked to liberate more of its vital force, both doubtful benefits; they are impotent to check, to counterbalance, the real evil, the disturbing force. Examples of different varieties of ill-health.

CHAPTER III.

THE PRINCIPLES OF ILL-HEALTH.

"If, then, there exists this state of equilibrium among a definite set of internal actions, exposed to a definite set of external actions, what must result if any of the external actions are changed? Of course there is no longer an equilibrium. Some force which the organism habitually generates is too great or too small to balance some incident force; and hence arises a residuary force exerted by the environment on the organism or by the organism on the environment. This residuary force—this unbalanced force—of necessity expends itself in producing some change of state in the organism."—HERBERT SPENCER.

"Any fresh force brought to bear on an aggregate in a state of moving equilibrium must do one of two things: it must either overthrow the moving equilibrium altogether, or it must alter it without overthrowing it; and the alteration must end in the establishment of a new moving equilibrium. Hence in organisms, death or restoration of the physiological balance are the only alternatives."—HERBERT SPENCER.

"Telle est dans le corps humain la terminaism nécessaire de toute maladie partielle; c'est l'économie entière qui seule peut la guérir, soit en faisant rentrer dans l'équilibre organique la partie troublée, soit lorsque cette partie n'est pas d'importance majeure, en étouffant son action. Le concert alors démeure incomplet, mais puisqu'il y a encore équilibre organique entre les parties qui restent, c'est un concert encore."—ED. AUBER.

"NATURE," says Professor Huxley, "is the expression of a definite order with which nothing interferes." In this chapter we shall see that order pervades what, in our ignorance, we are wont to regard as pre-eminently the realm of disorder, bodily disease; and that the symptoms attendant on loss of health are merely phenomena, the necessary result of the *orderly* behavior of a body in the presence of unusual surroundings.

In our last chapter we concluded that health consisted

in the existence of a condition of equilibrium between two aggregates of force, the one representing the body, the other its surroundings, its environment. To adopt another phraseology, we may define a condition of health as a "correspondence with the environment."

Now, keeping our eyes still upon the recognized laws of physics, let us ask ourselves what are the consequences of a disturbance of a condition of equilibrium, either of the stable or of the unstable kind?

And we will answer the question by selecting a homely example.

At Tunbridge Wells there is a large stone called the Toad Rock, which, under ordinary conditions, though resting on a comparatively narrow base, remains upright and motionless. It is immobile, because it is in a condition of stable equilibrium, the force of gravity which would urge it downwards being counterbalanced by accurate adjustment of adverse forces. But if there be brought to bear on this poised stone a side pressure, it will be made to sway backwards and forwards for a short time, after which it resumes its former position and its original immobility.

But suppose a stronger force act upon it, suppose that a large bullet be fired against it so as to dislodge a mass, say of two or three pounds' weight. In such a case the rock will, after swaying, again become motionless, but now the equilibrium will no longer be perfect, and any, even comparatively small, fresh amount of force exerted on it, while producing a swaying as heretofore, will seriously jeopardize its position.

But, thirdly, if, instead of a bullet, a cannon-ball were to strike it, or some other very great force were brought to bear on it: in such a case the equilibrium would no longer be perfect or imperfect, for the rock would be sim-

ply overthrown, either because too large a portion of one side was knocked away, or because the whole mass was bodily forced over or shattered; in either case, its original poised position would be lost to it forever.

And what is true of the Toad Rock and of conditions of stable equilibrium in general, is equally so of unstable equilibrium. There are only three possible results as a consequence of disturbance by unusual force. In a pendulum, for example, we shall have an excess of movement to counterbalance the excess of force, and then restoration of the old order of things; or we shall have such excessive movement accompanied by a partial destruction of the pendulum ending in an unsatisfactory, albeit still regular, set of oscillations which will not be productive of accurate time-keeping, and which will bring the clock-mechanism, by a few minutes or hours, according to the damage done, prematurely to a stop; or, finally, we shall witness, as a result of a yet greater force, a complete and sudden arrest of all movement.

Let us apply our principle to man. In health his body is in a condition of unstable, of moving, equilibrium with its conditions of life.

Let the balance be disturbed by a trifling lack or excess in either factor of the balance—for in both cases the result will be the same—and we witness in him the symptoms of ill-health, of derangement, just as we do in the clock pendulum. The rhythm of the vital movements—one or all—is disturbed. The breathing-power, the heart-beat, the regularity of thought, some or all the ordinary sensations of health, undergo variation. By and by, if the action of the excess force, be it in the shape of a fever germ, or of an unwonted exposure to a low temperature, or even of exposure to the ordinary conditions of life when the bodily vigor is depressed by want of food, be

removed, complete health returns, and we say that the patient has been suffering from a *functional disorder*.

But suppose the excess force be of more powerful kind —a potent fever germ, for example—the blow dealt is swift and strong. As to the result thereof, much will depend on the vigor, the amount of force in the body and its availability to meet this crisis. If either of the latter are found wanting, then *partial destruction* of the body will result. The excess force having thus expended itself, health returns, but a less secure health than before, a condition of body that, if life is to reach its natural term, must have adapted to it a special environment. This is *organic* or *structural disease.*

Finally, from feebleness of the body, or from the presence of a very unusual force in the environment, the complete and rapid overthrow of the body may ensue. This is *mortal disease*, merely an advanced degree of organic disease.

Now, if the above view of disordered action in the human body be correct—and let the reader remember that the principle it embodies is one unchallenged in physics, and the application of it to living organisms is chargeable to no less a scientist than Mr. Herbert Spencer—it follows of necessity that the symptoms of disease are the efforts of the bodily forces to attain re-equilibration or health, and must in rational treatment rather be fostered than combated, the *cause* of their appearance—the unusual force—being the only evil to be removed. Again, most heretical of conclusions, it will also follow that symptoms cannot lead to organic disease, to structural decay, as they are, by even leading medical men, every day asserted to do, for it can only be the persistence of *the cause* of these symptoms, the persistence of an unbalanced force, that can convert functional into organic disease.

Thus, to seek a practical example, it cannot be said that the symptom called diarrhœa can, if neglected, produce dysentery, but it is the persistence of the cause that produced the diarrhœa, the impossibility of getting at it and removing it, which is the cause of the dysentery. As far as the mere symptom, diarrhœa, is concerned, its aim is purely beneficial.

To this argument, which, if correct, would prove orthodox medicine—at the best so notoriously unsuccessful, when subjected to practical tests, as to raise serious question as to the morality of its use among the higher ranks of those who now profess it—to be founded upon gross physical error, upon a misinterpretation of natural phenomena, the only serious reply that can be made is as follows: May we not, say the advocates of the orthodox system, support, by means of suitably adapted physic, the body locally or generally, and thus enable it to withstand the effect of these adverse forces which threaten its derangement or its overthrow; just as, in the case of the Kentish rock, we might arrest, by exerting pressure on the side opposite to that on which another one was pressing, the swaying movements. Certainly, but conditions, all wanting, are necessary to give success where the human body is concerned. In the first place, you must possess, in medicines proper, agents equal to the task, you must be able to control and localize their action, and you must obviously apply your counter-force at the right moment, the very start. Moreover, you must be able to gauge exactly the adverse forces. Now, the only agents that can generate force in conjunction with the bodily cells are foods, and these must be given prior to the attack of disease. No known drug—if we except such drugs, *e. g.*, cod-liver oil, as are really foods—has any power to generate in the body any force, though some, of which nature

are the stimulants and tonics, can liberate force already stored in the cells, leaving the latter afterwards weakened and palsied. In great emergencies, extending only over a few hours, and as a mere *pis aller*, such stimulating treatment may in rare instances be recommended. Even then it is fraught with subsequent danger, while to attempt to apply it generally in disease would indeed be a midsummer madness. Again, of no medicine can the effect be really localized or controlled. The medicine, which you wish to do merely one or two things, persists, when it enters the body, in effecting a dozen other changes that you do not desire. Yet more, you know nothing of the kind and intensity of the forces you wish to counteract, and but little of the direction in which they act. Who, for example, can pretend to give a real sketch of the order and variety of phenomena to which a single fever germ gives rise?

As a matter of fact, however, orthodox medicine never recommends really the combating of a cause, the opposition to it of an equal force, a principle that would be intelligent, even though its carrying out were plainly impossible; a brief study of the standard works on therapeutics will show that it tries to effect something very different, something easier, something indisputably wrong. It seeks the arrest of symptoms after they have arisen. It combats these while deluding itself into the belief that it is sapping their causation. Now just imagine, in the case of the pendulum, what risks would attend the sudden arrest of the exaggerated movements which ensue on a disturbance of its equilibrium; the extra force must either be quickly distributed over the body that shall arrest these, or the pendulum itself will run the greatest risk of fracture. But no drug can, fortunately, act as a buffer to the symptoms of disease. What drugs do, what the thera-

peutist does, is to direct the symptoms, to prevent the effects of the mischief passing off most easily by the channel of the least resistance, that selected of necessity by Nature, and foolishly to distribute it over a dozen other ones. A diarrhœic symptom is arrested, but the skin, lungs, and kidneys pay a heavy price, unknown to the patient, for the questionable service. They *must* pay it, if the law that energy is indestructible be not an erroneous one.

It would not be difficult, though it would occupy too much space, to show that, as regards the race of man, disease itself is a benefit, cutting off the weaklings, improving and rendering more secure the lives of the stronger; while as regards the individual man the symptoms of disease are his real friends, the only bulwarks between himself and worse evils.

The words of Pope may not inaptly close, for the present, this subject:

> "All nature is but art, unknown to thee;
> All chance, direction, which thou canst not see;
> All discord harmony not understood;
> All partial evil, universal good;
> And spite of pride, in erring reason's spite,
> One truth is clear, whatever is, is right."

Having dealt with the *rationale* of the symptoms and consequences of loss of equilibrium, of ill-health, let me seek in each of its departments, the functional and the organic, a homely illustration of the principles involved.

Functional Disorder.—D., who has of late been much depressed in health by overwork and worry, goes to a ball, feeling somewhat fagged, but otherwise fairly well. He experiences fatigue in the course of an hour or two, which is relieved for a time by a few glasses of wine. He goes home at an earlier hour than is usual, and, though the

night be fairly mild, experiences on his way very distinct sensations of cold. After retiring to rest he finds it difficult to get warm, and wakes up next morning with the ordinary symptoms of catarrh in the head, which, in twenty-four hours, extend to his chest and are accompanied for some days by slight feverishness, lessening of the appetite and of the excretions, an increase of thirst, and, in short, all the ordinary signs of a cold.

The interpretation of the sequence here is easy. The worry which preceded his going to the ball weakened the action of the nervous system, and lessened the resisting powers of the body, so that even moderate cold, following upon the heat of the ball-room, by acting upon him as a force which his body could not balance, sufficed to produce the malady. On his way home the contraction of the blood-vessels in the skin, brought into contact with a colder atmosphere, was a benefit; had it not occurred he would have lost heat rapidly by radiation, and might thereby have run a grave risk of death. The nerves of the body, however, failed to perform their ordinary duty, to distribute the extra blood thrown suddenly upon the internal organs evenly among the latter, and as a result the superficial layers of tissue in the throat, nose, and bronchial tubes, probably because they were most exposed to the action of the cold, were the chief seats of the symptoms, and became congested, receiving more than their normal supply of blood. No one will surely deny that, in such a state of matters, this congestion, this symptom of derangement, was beneficial. Had it not occurred, had the blood-vessels not been susceptible of this dilatation they would have given way, would have burst, or a congestion of some other part, but still a congestion, and for the same reason beneficent, would have occurred. The bronchial and nasal congestions are followed by a secondary symp-

tom, for from the dilated blood-vessels begins to ooze fluid, and the more this fluid escapes, and the more the patient gets rid of it by coughing and clearing his throat and nose, the easier he becomes. The rapidity of breathing, another symptom, was equally beneficial, for, the normal aërating power of the lungs being crippled by this congestion, a greater number of respirations was requisite to perform the necessary amount of work. The lessened appetite was another good, for, in the state of feverishness, consequent on the chill, but little assimilation by the cells was possible, and food taken in the ordinary amounts would have taxed severely and injuriously the already lessened power of the kidneys and skin. Thirst was a benefit as tending to promote assimilation, to thin the blood, and to restore the functions of the kidneys. Even the feverishness, the rise of temperature, had its good uses, for, by lessening the intake of much food and consequent increase of the already excessive blood pressure in the internal organs, it promoted a return to health.

So that really all the phenomena witnessed had, as sole end, a return as speedily as possible of the body to a normal state, a return which is complete in a few days if the sufferer merely keeps in an equable and mild atmosphere —*i. e.*, if he keeps the cause of his derangement at bay. If any form of artificial treatment be attempted it should, in this case, surely take the form of an imitation and assistance of those efforts which Nature is herself so wisely making to insure a return of the bodily equilibrium. Even then it would probably do more harm than good, since such treatment would be in the nature of a local stimulation, and, as such, would be followed speedily by reaction, which latter process might lead to further dangerous mischief. If people could only often witness a comparison

between the rate *and perfection* of recovery in cases where the derangement is allowed to run its course, and those in which it is actively interfered with, they would be disillusioned of their reliance on drugs. They do not know how often the complications arising in a complaint are accredited to the malady and the recovery to the drug, whereas the recovery is due to the natural course of the malady, and, in at least half the cases, the complications are due to the drugs. This may seem too sweeping a statement, and yet if people will but remember that the methods of treating similar derangements by different medical men are usually widely different, and that out of all the adopted plans but one can really be correct, they must agree with me that the practice of medicine, unless built on very sure ground, on facts that can be demonstrated to be truths—whole truths, not the half-truths of the ordinary therapeutist—and pursued with the utmost caution, may well deserve the censure which Shakespeare puts into the mouth of Timon:

> "Trust not to the physician;
> His antidotes are poison, and he slays
> More than you rob."

If, instead of seeking an example of this variety of loss of balance, in the case of a man whose bodily power is below par, we had chosen to instance a man of normal vigor exposed to the action of some, to him, unusual force, such as excessive cold and damp, we should have witnessed the same result as that already described, and the phenomena observed would have admitted of the same interpretation.

Organic Disease.—We now turn to a class of derangement which is of much greater importance, to that which results in destruction of some portion of the body, and which renders the subsequent course of life an exceeding-

ly uncertain one, and which, unless the invalid can protect himself by an artificial environment suited to his damaged structure, must result in curtailment of life, while it always exposes the patient to grave risk of death from what, in secure health, would be called trivial causes.

The following will serve as an illustration of this variety of disorder:

E., a London business man of middle age, unused for years to great muscular exertions, in place of his usual Margate holiday trip, taken *en famille*, accompanies some young friends in a rowing excursion on the Thames. A few days of such exertion, combined with the exposure to damp at night in the camping-out, which is a part of the programme, suffices to bring upon him all the symptoms of rheumatic fever, and to confine him for three or four months to a warm bedroom. At the end of that time he feels himself again, though his doctor has warned him that a valve in his heart has become incompetent by consequence of the violence of the attack of illness through which he has just passed.

His body is now in a state of insecure, of really imperfect equilibrium, one that under the ordinary, the former, conditions of life must lead to premature death. How comes it, then, that the patient feels as well as ever? Every day the forces in the environment are outbalancing the sum of the forces in the body; but where are the perturbations due to this? In the heart itself, which, by undergoing organic change in the shape of thickening of that cavity which is closed by the defective valve, is still effecting a balance. But this process must come to an end before long, for this forced expenditure of the energy in the heart cells must, under any circumstances, lead to their premature exhaustion, and thus to an arrest of their multiplication and of their functions. The day of failure then

comes ; henceforward the heart falls out of line with the other bodily organs. Suppose the old course of life to be still pursued, the symptoms attendant on the discrepancy between the bodily force and the forces resident in the conditions of this man's life now begin to be developed in other organs; the breathing becomes short and so on; but even these symptoms have, in the bodily condition now under review, an aim conservative of life. Later on, yet another beneficent symptom, dropsy, supervenes. But for this exudation of fluid from the distended blood-vessels, these latter must give way, or the current within them must be arrested, either of which events would cause death. Finally, even the limits within which dropsy can save our embarrassed patient are reached, and death results.

Gloomy as is such a record, it must strike the reader forcibly that the exercise of a little common-sense on the part of the patient might have done much for him. Had he, in the earlier stages, only cut down his environment, his habits of life, to the impaired structure of his body—life by such a course might have been saved, and even when his breathing became impaired, wise economy in respect of the demands made on his bodily powers must have secured a longer lease of life.

Finally, in organic disease, the proportion between the forces in a body and those in its environment may be so dissimilar that death of the whole body may quickly result. Thus a human body immersed in water is brought suddenly into contact with conditions normal to a fish or even to the mammalian whale, but incompatible with human life.

Under organic disease must also be classed every inherited structural change in the man. A few words of explanation will make this clear. We have in congenital

diseases, such as scrofula, gout, inherited syphilis, inherited insanity, idiocy, etc., examples of a sufferer starting in life with a structural flaw—never, from the very first, can he equilibrate properly the environment of healthier beings born under the same climatic conditions. We have in these cases a faulty, an imperfect, equilibrium from conception, the body being comparable to a badly made watch, which can never be made to indicate, for more than a very short period, the right time.

We all know that such unfortunate individuals can never be placed on a par with their healthier neighbors of a similar age. We may, by "tempering the wind to the shorn lamb"—in other words, by artificially suiting the environment to the special conditions present—keep down, or avert for a time, further structural mischief; but the risk of such mischief is, as every practical man knows, at all times very great. These weaklings are the children of elderly, degenerating parents, or of parents with some, possibly latent and unsuspected, structural weakness. They are commonly the offspring of marriages of consanguinity, the children possessing a double dose, one from each parent, of any family failing, and therefore exhibiting very markedly some one defect.

The so-called tumors, new growths, such as cancers, fibroids, etc., never spring from degenerated tissues, for the vitality of the cells of such are exhausted, but from tissue possessing some balance of vital energy, which balance is exhausted, or largely so, in the growth; it is probable that cancers spring from embryonic cells, from cells that have, from various reasons, lain dormant—slept, as did the hare in the fable—during the race of life, and which some irritation has suddenly aroused to life and excessive growth.

The cancers, and other so-called malignant tumors, are

dangerous mainly by reason of the special adaptability of their cells to travel by the blood and lymph channels, and then to set up similar growths in other and distant parts of the body.

CHAPTER IV.

THE PRINCIPLES OF SCIENTIFIC MEDICINE.

TREATMENT BY ORDINARY MEASURES.

Résumé of position. The ordinary measures of treatment, food, climate, and habit.—I. *Foods.* Rules to guide us in their administration. These rules as modified by disease. Food accessories and artificial digestive agents.—II. *Climate.* The purity, temperature, and humidity of the air and the effects of these on health.—III. *Habits and modes of life.* Fallacies of hygienists. General rules.

CHAPTER IV.

THE PRINCIPLES OF SCIENTIFIC MEDICINE.

TREATMENT BY ORDINARY MEASURES.

"La nature est formatrice, conservatrice, et médicatrice. Voilà le principe fondamental de la médecine.

"Il n'y a qu'une médecine, celle qui repose sur les lois de la nature. . . . Nous avons eu jusqu'ici assez de systèmes pour savoir que la médecine ne réside point en eux."—ED. AUBER.

"Peu de maladies guérissent dans les circonstances et les lieux où elles naissent et qui les ont faites. Elles tiennent à certaines habitudes que ces lieux perpétuent et rendent invincibles. Nulle réforme pour qui reste dans son péché originel. . . .

"La terre est son médecin; chaque climat est un remède. La médecine, de plus en plus, sera une émigration, une émigration prevoyante."—MICHELET.

HITHERTO we have discussed, perforce with the utmost brevity, and only in general terms, the great foundations on which medicine, if it aspire to the rank of a science, must rest.

So essential is it that these great underlying principles should be engraved on the mind of the physician—be he amateur or professional—that, at the risk of being convicted of tedium, I shall venture, ere an advance is sounded to the practical points of treatment, on a brief recapitulation of the present standpoint.

I. Human life consists of two movements.

(*a*) *Molecular Movement* (*i. e.*, chemical activity or chemical movement) occurring between each cell and its cell-food, albumen. The net results of this ceaseless proc-

ess are, as explained in our first chapter, multiplication of cells or growth, specialization of cells or development,* and the evolution of some few of the energies of life.

The original, or germ, cell, the progenitor of all the body cells, is a somewhat intricate compound, consisting, nevertheless, of but six ordinary elements. Its latent or dormant power is due solely to its intricacy of structure, to the fact that it contains stored up within itself the energy expended by its parents in the production of its complex structure. This latent molecular, or chemical, energy exhausts itself gradually on the albumen with which it is brought into contact, and thus new compounds, new cells, at an ever gradually decreasing rate, are produced.

Eventually, and as a natural consequence of the process just described, both intricacy of cell structure and emission of energy become, the first so simplified, the second so minimized, that no further chemical interchange between cell and albumen can occur; then ensues natural death.

The germ-cell thus contains no special, no supernatural, energy; its action on albumen is closely similar to that of a coiled watch-spring, or an elevated weight, on a clock mechanism. The price of each vital act in man, as of each revolution of the smallest wheel in the clockwork, is dissipation of a portion of that limited energy to which alone the movements of both man and clock are due.

(*b*) *Mechanical Movement.*—This variety of movement —not essentially different from the molecular, or chemical, form, if chemistry be regarded as a branch of physics —is that which we witness when the whole body, or a distinct portion thereof, is set in motion by means of the

* Food but partially specializes cell tissue; other environing forces take a large share therein.

store of heat-energy produced by the combustion of fuel-food (fats and starches) within its tissues. The origin of this heat-energy and the method by which it produces motion are identical in man and in the ordinary steam locomotive, though in the human machine, by far the more perfect of the two, combustion is not only more complete, but the regulation and the steering of the machinery are also provided for.

The molecular movement therefore builds man and endows him with life in its most restricted sense; mechanical movement works the formed and complete machinery.

The demand for albumen steadily decreases, *per unit weight of living bodily tissue*, from conception to death; that for fuel-foods shows also, under conditions of perfect tranquillity, a similar decline—for the heat-storage power of cells decreases as they simplify—but this latter fall is masked by the fact that with all increase of work, up to a certain limit, a proportionate increase of fuel-food is, of necessity, demanded.

II. We now view man as a single, complete being.

As such he represents a comparatively small and fairly constant sum, or aggregate, of forces, brought ever into contact with the inexhaustible and varying forces (the aggregate of forces) in his environment.

If man is to exist, his body must be able, without destruction of any essential part, to effect a ready balance with these environing forces. Since, however, the sum of forces in both body and environment is ever changing, actual stable equilibrium is not attainable, but the body oscillates rhythmically, like a pendulum, about its centre of stable equilibrium.

These rhythmical oscillations are represented by the regular movements of health, breathing, heart-beating, etc.

III. If this general moving condition of equilibrium be

disturbed, either by some unusual deficiency in the body or excess of force in its environment, the effects observed will depend exactly upon the amount of force present in the environment *in excess of that needed* for the rhythmic health movements, and this excess force will, (*a*) if it be slight and its action but temporary, produce exaggerated oscillations (increase, or other derangement, of normal breathing, etc.) until, being balanced by the latter, the regular oscillations of health will return. This series of phenomena constitutes *functional disorder.* (*b*) But if severe and temporary, it will produce the same phenomena, plus destruction of tissue. This is known as *organic or structural disease.* If the part destroyed be not a vital one, a secondary and imperfect state of moving equilibrium will, in the course of time, be established.

If the excessive force be permanent, it will produce, in *a*, a *chronic* state of functional disorder, ending in premature exhaustion of the mechanism (whether clock or body), and, in *b*, will tend to a still more rapidly fatal termination.

Such, then, are our positions compressed into the smallest possible space. We have but two great classes of disease to deal with: the *functional* variety, with its accompanying symptoms, all beneficial, because all tending to counterbalance that excess of force present which is beyond the normal of health, and all ceasing when that force has been finally balanced. The body of man in such an emergency, like the sapling in a gale, bends before the storm to rise again erect and unhurt when the winds have fallen. In the second variety, the *structural*, the body of man again, in proportion to its youth and the elasticity of its frame, bends at first, but, when the utmost limit of elasticity in some parts has been reached, there will yet remain, pressing on those parts of his body, a force still

unbalanced—then are such parts, which are those that are weakest and which offer most surface to the force of the storm, broken or blown away, and when the gale has passed and the uninjured parts again erect themselves, the body shows its damage and bears lasting marks of the danger through which it has passed. Finally, parts of the structure essential to life may be destroyed, in which case no recuperation is possible. This corresponds to death. Structural disease is, as regards the individual, an evil, in so far as it entails destruction, to a greater or less extent, of his bodily mechanism; but as it affects mankind in general, it is a benefit, since by its aid the human family is gradually, and to its lasting good, purged of its weaker and less perfect members.

There is perhaps yet one more point to which a few lines of explanation are due. What part, it may be asked, does the spirit of man—his soul—play in the processes of physical life? Apparently none whatever. The body of man *generates* no energy, that which it emits is the exact equivalent of that which it acquires from its foods, and life is the *result,* not the cause, of energy. The spirit of man has no share in the working of his physical structure. It cannot, in fact, participate in a material process, unless our definition of it and our knowledge of matter and energy be both at fault, for if the spirit be immaterial, it cannot contain that which alone can influence the body—energy—since energy can exist but in union with matter, in fact is probably identical with matter. Much mystification in the public mind has arisen from the vague and emotional tones in which some even good scientific men speak of the human germ-cell. They will ofttimes invest it, as does the love-sick swain his Dulcinea, with hypothetical charms and virtues. Does the germ-cell contain a diamond edition of man? are the various portions of the

body already contained in it but invisible to us by reason of their minuteness? Does this cell contain a special, vital force? What are these mysterious somethings, life and power of growth, which it possesses? Such are a few of the fanciful problems with which these philosophers torture and perplex their own minds and those of their disciples. As logically might they ask if the water of a stream that kept in motion a paper manufactory, itself contained the paper, or if the coiled watch-spring or the elevated clock-weight contained the wheels and pins, dial-plates and hands of the clock. The germ-cell corresponds to the falling water, containing like it a simple potential energy, the albumen (*i. e.*, tissue-food) ever presented to it corresponds to the machinery of the mill and the raw fibre in its tanks. The result in the one case is a man, in the other paper. If the emotional scientist must give vent to his emotions over some material idol, let him then adore rather the albuminous food, by far a more important factor in the production of a human being than is the germ-cell.*

And now to the question of treatment. As all disease may be conveniently divided into functional and organic, so, for the sake of clearness and convenience, may all measures for its relief be spoken of as ordinary or extraordinary. The classification is, I am well aware, bad and utterly unscientific, since derangement can be properly met only by such agent or agents as exactly counterbalance the effects of the cause of such disorder, and as no disease is in a proper sense extraordinary, neither can

* I do not of course deny the existence of a supernatural spirit in man, though neither belief nor denial is here in question, but I protest most strongly against the assumption of an *unknown* agency in man and the subsequent adoption of such agency as a *known* and potent factor in physical phenomena. It is to such trickery only that I object.

there be a remedy to which such an expression can apply; yet so tangled is the maze of applied medicine as usually understood, so overgrown with the weeds of untenable theory and of incomplete experiment—the former, as we shall see, a form of fallacy known as the *suggestio falsi*, the latter of the nature of a *suppressio veri*—that I have found it impossible to deal with the whole subject of treatment as one, and have been compelled to divide it into two categories, the former, the so-called ordinary measures, to comprise the well-known forces of Nature in their usual garb; the latter, the extraordinary, certain concentrated and less known, or more complex, natural forces popularly recognized as drugs.

Ordinary Measures of Treatment.

The ordinary means at the disposal of man for the maintenance of his health, or for its restoration when lost, are capable of being grouped into the three headings of food, climate, and habit. They represent the three powers most ready to his hand, and to which he naturally first turns to effect the process of re-equilibration.

Bearing in mind that we are concerned as yet only with the principles, the rationalia, of treatment, and that its practical details fall to be discussed in the second part of this book, I shall limit myself to the enunciation of general facts only.

I. *Food.*

The necessary aliment of man consists of four very different varieties of substance.

(*a*) *Tissue-food*, or albumen, derived from the once living and therefore most highly organized parts of plants and animals. The flesh of animals and the seeds of plants (storehouses of potential life) are representative structures, rich in this tissue-food.

The duty of tissue-food is—after it has undergone conversion from the colloid to the crystalloid state by means of digestion, has then entered the blood-stream and undergone some combustion in the liver—to interact chemically with the living cells of man's body, and to thus produce the essential phenomena of continued life. Tissue-food, in short, in conjunction with living cells, causes the body to grow at first, and afterwards maintains, but with, of necessity, a gradually decreasing power as the cell energy becomes lowered, the living structure.

(*b*) *Fuel-food*, represented by the fats, sugars, and starches, is—after its conversion by digestion from a colloid to a crystalloid form—absorbed into the blood, and, by means of the oxygen contained in that fluid, burned (oxidized) so as to supply heat-energy, necessary for the bodily movements.

It must be admitted that even albumen undergoes *some* combustion and therefore assists, though but to a trifling extent, in the development of the heat-energy.

(*c*) *Water*. Necessary to dissolve the crystalloids and to keep them in solution in the blood.

(*d*) *Inorganic salts*, of which common salt is the chief. These seem to assist the chemical actions without taking part in them. They have been compared, somewhat inaccurately, to the oil used to lubricate machinery.

Now, let us see if we can arrive at anything like a useful general rule to guide us as to the necessary amount of each of these foods in a condition of health, for we must solve this question ere we can undertake to vary the amounts in cases of disorder.

Normal Requisite of Tissue-food.—In endeavoring to discover some rule for general guidance, it occurred to me that, if it be true that growth is due to the action of living cells on albumen, and if the individual cell-energy de-

clines gradually from conception to death, as it must do if it can only live by expenditure of its store, that, per unit of weight of living tissue, the demand for albumen must show a steady decline, quite irrespective of bodily work, during the whole period of life. Every diet-table, though such are founded only on a practical basis and are simply the result of experiment, I found to bear out the truth of this.*

The mean of such tables gave the following result, reckoning for people of ordinary fatness, for fat, not being a living tissue, but merely representing stored fuel, must, in cases of obesity, be allowed for in calculating bodily weight.

Per pound weight, per diem, at birth the demand is about 30 grains, avoirdupois. As life advances this demand falls each year steadily at the rate of from $\frac{1}{5}$ to $\frac{1}{4}$ of a grain, till in extreme old age it has been reduced to 15 grains per pound weight, or but half of that at birth.

Take a young baby, say of 18 lbs. weight, and, according to the above rule, it will need 540 grains of albumen per diem. Now, each pint of cows' milk contains albumen, in the form of caseine, to the extent of about 360 grains, and therefore $1\frac{1}{2}$ pint per diem will be the normal daily demand, and it is one which experience confirms as sufficient.

Of mother's milk, which is poorer in caseine, more, about 2 pints, will be required.

Let us now take the case of an old man of, say, the weight of 154 lbs. (11 stone). His demand per lb. weight, per diem, is 15 grains, and thus the total demand for his

* The tables from which the above calculations have been made are those of Drs. Parkes, Davy, Playfair, De Chaumont, Von Voit, and Von Pettenkofer.

period of life will reach 2310 grains, or about 5 oz., of albuminous food. This represents the caseine of 6 pints of milk, and accords with the quite recent results of Dr. Germain Sée's investigations, for he reckons 3½ litres, almost exactly 6 pints, to be the normal daily requirements of albumen in old age.

It is quite possible that my calculations, being based on minimum necessary amounts, may fall a little below the physiological needs in some cases, but this does not affect the truth of this very useful underlying principle.

The demand for albuminous food is not affected, of course, by any conditions of work, of climate, of race, of occupation, etc., all of which have a vast influence in modifying the demands for fuel-foods and water.

Now let us ask ourselves what are the results respectively of an excess or an undue lack of this necessary albuminous material.

An excess over and above the normal demands cannot increase growth or favor renovation of tissue, while a deficiency will hamper both of these processes.

Excess of albuminous food, all of it that will pass the portals of digestion, will of course be burned, as all albuminous food is burned in the liver; but if the excess be great or habitual, this oxidation process may be impaired, and gout or biliousness, as we shall see later on, will be the direct result of this overwork of the liver. But, supposing the liver equal to the excess, then, after combustion, the excess of albuminous food will be cast out of the body by the kidneys. An excess, thus, of albumen, while it assists somewhat in maintaining bodily heat and energy, by virtue of the combustion process which it must undergo, taxes severely the stomach, intestines, liver, and kidneys.

But the cells in the body of man must, if they are to ex-

hibit a regular series of phenomena as an outcome of their interaction with tissue-food, be supplied pretty equally at every part of the twenty-four hours with albumen. How is this equality of distribution to be maintained when food is taken but intermittently? By a very simple process, analogous to that by which a city is kept, both in wet and dry seasons, supplied with water, by the intervention, between the source of supply and the consumers, of a reservoir. The blood channels serve this end, and, as we shall see later on, the fluid portion of the blood is scarce anything more than a store of digested albumen, constantly supplying the cells with their necessary amounts, itself intermittently fed by our daily meals; while we shall also find that the liver acts similarly as a storehouse for fuel-food of the starchy and saccharine order, placed between the supply and the demand; while the loose cellular tissue of the body plays the same *rôle* in reference to the fatty foods. Thus it comes about that, provided a man be supplied but with plenty of drinking-water (which always contains some of the necessary inorganic salts), he may, while deprived of every other form of food, not only live for many days, but live with a comparatively trifling loss of energy, especially if he be kept at rest and warm, for when at rest but little fuel-food is consumed, as the demand for heat-energy is small, while a warm atmosphere prevents any but the most trifling loss by radiation from the body to the surrounding air.

But to return to our tissue-food. We have seen what the rule of the health supply is, let us discuss in what way this rule is modified by the presence of disease.

The Place of Tissue-food (Albumen) in Disease.—The human body being, as we saw in our first chapter, not a vast compound of beings, but a single individual, a unit, between each of which parts there is such close relation-

ship that when one cell thereof is thrown off (in generation), it bears in it the impress of the whole body down even to its minutiæ, there cannot be, as in fact there is not, such a thing as local disease. The cells of one part may die or weaken before those of another, by reason of extra strain or of inherited debility, but to imagine that in a perfect mechanism like the body, all of whose parts are interdependent, none of whose parts are *de trop*, one atom even can be lost without the whole body feeling and sharing in the loss, though our perceptions may not be fine enough to allow us to discern it, nor our microscopes potent enough to be able to measure it, is a physical absurdity to which no thoughtful man will subscribe.

All disease is therefore, perforce, general, though it is naturally the organs most allied in function or most approximated in position to the seat of greatest disorder, to the so-called local malady, that share most in the manifestations of derangement.

All bodily disorders—some more, some less—interfere with the great function of nutrition, that one function which every organ of the whole body is built, directly or indirectly, but to subserve. Disease always hinders, when severe is said by competent authorities even to arrest, the action between living cells and their tissue-food, the cells in the cases of arrest seeming, by the imbibition of water and salts, themselves to undergo a series of chemical changes which serve to maintain, but of course for a short time only, an imperfect life. Personally, I do not believe that actual arrest of the assimilation process by cells ever occurs, can ever occur, in a living body, but there can be no doubt but that in severe fevers the power of assimilation falls very low indeed. This impediment to assimilation of tissue-food in all disease is a cardinal fact to be remembered, and the one on which the dietetic management

of all disorder is to be built. Concurrently with it, and proportionately to it, and also as a consequent of the bodily derangement, the digestive powers fail.

In mild bodily disorders, and the best general guide we possess to the mildness of a disease, though it is but a rough one, is the clinical thermometer, we therefore diminish the *total* quantity of tissue-food given, and we give it in the most simple form and with plenty of fluid. The simplicity of form serves two purposes : first of all it taxes less the *muscular powers* of the digestive organs, a very important and essential part of the digestive process, and one, of course, also weakened in disease ; secondly, it enables any amount given in excess of the digestive capacity to pass off by the intestine in a shape likely to cause that structure least irritation, and also least likely to ferment and generate troublesome gases.

For these reasons we administer in mild febrile disorders, those in which the temperature rises to 100° or 101° F., semi-solid albuminoids and semi-solid foods in general, soups—of which milk, cheese, meat, fish, or seeds, such as lentils or beans, form the main albuminoid basis—and milk puddings, the ingredients in which are slowly and thoroughly cooked and not bound together by egg albumen. Then we often allow ripe fruits, especially such as are rich in grape-sugar, and also easy of digestion. We always give plenty of water. Finally, we possess various important, and indirectly highly useful, pseudo-foods, alcohol, gelatine, tea, coffee, etc., which possess, according to eminent authorities, a certain power in arresting the denutrition of cells, and, while not actually foods, are, like the fire-bricks placed in some grates, economizers of fuel.

In severe disease, when the temperature mounts, and in proportion as it mounts, to 104° F., or higher, we decrease the amount of albumen given as food, while we exercise

greater caution as to the form in which we give it, and we increase, on the whole, the amount of water and salts. We make our soups and meat essences thinner, we often have to do away even with the milk puddings as being too great a tax on the exceedingly restricted digestive powers, substituting, for the starch and sugar which they contain, fruit drinks or even grape-sugar dissolved in water. We take equal or even greater precautions as regards the fats, trusting to the cream in ordinary milk as the sole fat likely to pass the digestive processes. For above all we dread, by an injudicious administration of over-much food, to impair further the performance of the digestive acts.

In the most severe of our cases, those in which we have reason to think that all, or nearly all, cell assimilation is at a standstill, our reliance falls on water, and the salts it contains, no mean food under the circumstances, for it can, by dissolving any remains of healthy albumen in the blood-stream, carry this on to the cells when all digestion is in abeyance. In this bad pass we may also turn hopefully to whey, and to infusions of tea and coffee, to gelatine, and above all to alcohol, which latter, in *very tiny doses only* (a teaspoonful of whiskey every hour is about the limit), but not in large ones, has apparently some power of arrest over the denutrition of the cells. The large doses, often administered, cannot do this; they can only stimulate, rouse the cells to emit that little last residue of energy, on the economizing of which rest our last hopes of recovery.

Normal Requisite of Fuel-foods.—This may be briefly stated in the two following aphorisms:

Per unit weight of living body tissue, there is a slight, but well-marked, decrease in the normal demand for fuel-food from birth to death.

But this demand is affected (within the limits of the digestive capacities) by the amount of work performed—*i. e.*, by the necessity for more heat-energy when much muscular work has to be done—and by the loss of heat by radiation from the body, the demand rising in cold weather, and when articles of attire that are good conductors of heat are worn.

It is seen, therefore, that this second rule will not permit of our representing the demand for fuel-foods, as that for tissue-foods, as an even descent throughout life, for the downward grade is often temporarily interfered with by extra demands for heat-energy to perform extra work, and by questions of air, temperature, and of clothing.

Both of the above rules appeal at once to our reason, for, as regards the first, it is clear that as the cells of the body decline in vitality, so, in proportion to such decline, must be their limit of storing heat-energy ; while as regards the second, it is evident that if heat-energy be the body's great motor-power, the supply of fuel must rise with the work to be done, and with the greater losses by radiation from the body.

The dangers attendant on an excess in the consumption and absorption of fuel-foods are those which follow on obesity, for such excess is deposited in the cellular tissues of the body as fat. When this deposit passes certain limits it affects by its weight and pressure the muscular tissues, rendering exertion difficult, and thus, unless some wise dietetic restrictions are taken, directly conduces to even greater deposits, until eventually the breathing powers and the heart's action become seriously embarrassed.

A deficiency in the necessary fuel-supply of the body causes loss of energy, and indeed one of the commonest troubles of advancing age, depression of spirits and inability for exertion, is often successfully combated by the

administration of easily digested fats. In addition it leads, at all ages, but particularly in the young, and for special causes to be mentioned in the second part of this work, to risk of lung disease.

The Place of Fuel-food in Disease.—Since fuel-food, by which we mean the starches and sugars (the carbo-hydrates) and the fats (the hydro-carbons), is, as compared with albumen, of simple structure, and does not undergo, as does the latter, with the molecules of the body-cells any known chemical change, it would at first sight seem that in disease we might, provided we did not exceed the digestive capacity, hope for very great help from a free administration of it. To a great extent, however, the vitality of the cells determines the amount of possible combustion of these foods, for, while there is strong reason to think that the oxygen carried by the red-blood corpuscles and the fuel-foods meet, and by so doing evolve their heat-energy *within the cell-substance*, it is certain that the cells store the heat-energy, and that their storage power is decreased by all forms of derangement. For these reasons much the same rules, guarded by much the same precautions, must govern, in disease as in health, the administration of both tissue and fuel foods.

But the fuel-foods are of two kinds, hydrates of carbon —*i. e.*, the starches and sugars, from which relatively but little energy, and that from the oxidation of the carbon only, can be drawn—and hydro-carbons—*i. e.*, fats, substances which yield for combustion not only carbon, but also a large quantity of hydrogen, an element from the combustion of which latter more heat can be evolved than from any other element. For these reasons the fats are, as fuels, worth nearly double their weight of starches or sugars, and there would seem a strong *à priori* reason for their employment in illness. Unfortunately, the teaching

of practical experience seems to indicate that the difficulty, even in health, of digesting fats is much greater than that of digesting hydrates of carbon, and, as we shall see further on, the process of digestion in the two cases is also very different.

Thus it happens that in states of disease we have to exercise, in regard to the fuel-foods, much the same care as in the matter of the tissue-foods, selecting from them the substances most easy of digestion, and administering these in a simple and liquid form. Among the fats, cream and butter are the most palatable and easy of digestion, but their taste must often be disguised, and they must be administered only in free dilution. In the case of the starches and sugars, the former well cooked in the form of farinaceous puddings with milk, but without eggs, are of great use in mild cases of illness, but they are very badly borne when the bodily temperature is high. Here, again, whey, by reason of its richness in sugar-of-milk, is often useful, or a malt extract, which may be generally reckoned on as being pure grape-sugar, may be given in barley or lemon water. Short detailed hints will be found in the Appendix, to which I must refer the reader for fuller information as to sick dietary.

The Normal Requisite of Water and Salts.—As to the necessary daily needs of the body in regard to water we have no rule, nothing much beyond our instinct, nearly always, by the way, a very efficient guide, to direct us. If the supply of this fluid fall below the necessary, the activity of the cells and their heat-storage power will both suffer, for only when in solution with water can albumen and fuel-foods serve their ends in the body. A deficiency in water supply will tell also in another way, for the waste products that should pass out by the kidneys having also to be kept in a dissolved state, it follows that elimination

by these channels will be interfered with, and certain diseases, especially gout and rheumatism, will then menace the body.

The various necessary salts of the body, of which common salt is the chief, are but seldom consumed in excess, and then they appear often to produce skin affections. Any deficiency in the supply of them is attended by much more grave mischief, by a general interference with the assimilation of food and by local changes in the kidneys, skin, and bones.

The Place of Water and Salts in Disease is an important one. We have seen that by the free administration of water *alone*, life may be prolonged for many days, and when we consider that starvation is, in nearly all disease, the *final* cause of death, we shall not be likely to undervalue it as a potent aid in the combat with grave disease.

Food Accessories.—Tea, coffee, coca, and cocoa each contain within them a substance which apparently has the effect of lessening cell waste. Used with discretion they are therefore, especially in disease, valuable dietetic aids. Alcohol, *in very small quantities*, is also serviceable in a similar way. Condiments, such as mustard, pepper, etc., are, in civilized races, useful, and, by reason of habit, often necessary adjuncts to food. They are not, as ignorantly asserted by certain hygienists, stimulants, but have become of the nature of the ordinary forces in the environment of civilized man, though in the lower animals they act as local stimulants simply because these latter are not of a race habituated as yet to their use.

Artificial Digesting Agents.—In what I hold to have been a singularly unlucky day for posterity, Dr. Eberle, rather more than half a century ago, first separated from the stomach of the pig its special digestive ferment, pep-

sin. Here was, in truth, a crutch for the crippled stomach of the dyspeptic; in this substance surely lay the hope of bringing food to the starving cells of the fever-smitten! So thought the public, and those of the medical world whose enthusiasm outran their knowledge of physiology. The debilitated stomach got weaker, more hopelessly unequal to work, by leaning on the support of pepsin, while the deranged stomach of the fever-smitten, taken at a disadvantage, let slip sometimes through its coats the artificially digested food, and hampered with it the body-cells —starving not for want of food, but because they could not eat—and often blocked the struggling kidneys, ending the life of the patient by the vast increase of nitrogenous waste thus intruded on the blood-stream.

Since its discovery pepsin has had a host of colleagues and rivals: trypsin, pancreatin, diastase, etc., all ready to the hand of him who thinks that the aim of medicine is to thwart and circumvent the operations of Nature, because such operations, in the case of disease, are sometimes unintelligible to him. Long since the great chemist, Liebig, gave birth to a vast truth when he said that "Nature refused to be made the handmaid of chemistry." There are, however, rarely occurring emergencies, as we shall see, when artificial digesters afford us a temporary aid, but this accommodation has even then to be subsequently and dearly paid for.

Any necessary special modifications of food in disorders such as gout, dyspepsia, etc., will be dealt with when the treatment of those disorders comes in question.

Brief as has then been our survey of the foods, it has sufficed to raise in our minds a strong suspicion that many disorders of man may be due to a deficiency or an excess in this, the greatest factor in what we call the environment of man. Let us now, under the heading of climate,

view the part that may be played by atmospheric air in the maintenance or the restoration of health.

II. *Climate.*

The question of climate resolves itself mainly into an examination of the air, and of the effects which the different airs exert on the body of man.

Purity, temperature, moisture, force, and direction are the qualities of air.

(*a*) *The Purity of Air.*—The average air may be said to consist of an admixture of $\frac{1}{5}$ oxygen gas and of nearly $\frac{4}{5}$ nitrogen gas, the small balance being made up of water, vapor, carbonic acid, and various other solid and gaseous ingredients. The oxygen may exist either in the form of the ordinary gas (O_2), or in the condensed and unstable form of ozone (O_3), which latter parts readily, when in contact with anything oxidizable, with the third atom of its molecule, and thus like oxygen, but to a yet greater extent, assists decay or the conversion of the organic to the inorganic, while in living beings that inhale it in small quantities, it assists the combustion of their fuel foods, acting thus as a mild stimulus in the production of energy.

Nitrogen gas in the air plays, as far as its discoverable influence on the body of man is concerned, the part of a diluent to the oxygen. The relative amount in air of carbonic-acid gas, the amount of which varies from 3 to 6 parts in 10,000 parts of air, is apparently only of importance to man inasmuch as with its proportionate rise is there remarked a change, a development, in certain very interesting inhabitants of all air, the bacteria.

The bacteria—in which term I include the globular micrococci, the long bacilli, the short bacteriæ, and the spiral spirillæ—are the *natural* inhabitants of the air, and are

probably of a vegetable nature. Their one function is to *cause fermentation* in dead or enfeebled organic matter—in other words, they are the agents of decomposition. Like everything else that has life, the bacteria may be altered in structure, and consequently in power and function, by their environment. It is on them that the difference in the composition of the air in various places tells, and through changes thus produced in them, that man is, in a secondary and indirect manner, affected by what is termed impurities of the air. The ordinary bacteria, the inhabitants of the air of open spaces, have no power to hurt the bodies of living animals; not that the bacteria are providentially designed not to affect these, but because the ordinary bacteria, like the other ingredients of ordinary air, are one of the usual forces in an animal environment, a force probably not only innocuous but beneficial. But new and strange conditions—as those which result from overcrowding—produce novel changes in the air, and novel varieties of bacteria, and these novel varieties represent a novel force—one unbalanceable by men and animals unaccustomed to them—which does not, of course, spare living tissue, but sets up, even within it, a fermentation which is called fever. Once formed, these novel bacteria, provided their surroundings be favorable, live and propagate themselves. Incredible as may seem to the lay reader the above statements, they are nearly all demonstrable by actual experiment.

(*b*) *The Temperature of the Air.*—Almost the sole source of atmospheric heat is the sun. Dry air, however, is so diathermic—*i. e.*, allows radiant heat to pass so readily through it—that it is only in proportion to the water-vapor present that air can be much affected by direct solar rays; in point of fact, the main source of the temperature of the air is quite indirect, and due to heat im-

parted to it by the solid and liquid substances of which the upper earth crust consists, and which have first absorbed, and then imparted to the air, the heat of the direct solar rays.

But the reflected sun-rays from light soils, from sheets of water, and even from snow-fields, are also sources of atmospheric heat. To the reflection from the neighboring snow-fields, Davos and Saint Moritz owe largely their high winter temperature; and to that from the sea, the winter health-resorts on the south of the Isle of Wight are mainly indebted for a like result.

But water plays, in the distribution of heat, other very important *rôles*. Water absorbs heat more than does land, and by reason of this and of the rising of the lower, warmer strata, when its surface cools, it has a more permanently warming effect on the superjacent air than land. Moreover, water is fluid, and, as a result of the inequality of sun-heat in the different portions of the earth, is kept constantly in motion. Thus the two great ocean currents, that of warm surface water from the equator to the poles, and that of deeper cold water from the poles to the equator, are formed. The first of these exerts a great influence in raising the mean winter temperature of certain portions of land exposed to its full influence to a point which their latitude alone would by no means entitle them to. Then, again, the winds that come to us in winter from over extensive tracts of sea, like our west and southwest winds, though moist, are warm, while the east and northeast winds at that time of year are cold, travelling as they do, before they reach us, over extensive tracts of land that have long since lost all the heat derived from their summer sun.

The relative position of mountain-chains and the protection they afford against cold winter winds, again affects

very considerably the mean winter temperature, while elevation above sea-level, and many other minor conditions, further influence it.

The effects of even hot direct solar rays, if the air be dry, are not much to be feared, and are rarely productive of sunstroke. If, however, much moisture be present, the risks from the latter disorder are very great if much exertion be undertaken, and this not only when the individual is exposed to the direct rays of the sun, but even while he remains in shade.

(*c*) *Humidity of the Air.*—The habitual presence of an excess of water-vapor in the air is traceable as a rule to one of two conditions—the neighborhood of large masses of water, especially of fresh water, and the nature of the soil.

Although the former of these might seem to have by far the more important effect on the air and on the human beings that breathe it, the opposite is actually the case, for, providing the air currents are not cut off by the shelter of surrounding hills, and the houses be raised well above the highest flood mark, the residents, even those much influenced by the presence of an excess of watery vapor in the air, are not very specially subject to the ailments which are apt, in people of certain constitution, to follow exposure to damp.

A damp and ever-perspiring soil is, however, a potent factor in *bringing out* rheumatism, gout, bronchitis, phthisis, catarrhs, and in actually developing more dreaded disorders, such as English cholera, ague, dysentery, croup, and diphtheria.

By a damp soil is understood one which is more or less impermeable to water. Clay is one great example of such. Not that the clay stands out conspicuous to the eye, except, perhaps, in patches here and there; it is covered usu-

ally by a few inches or feet of alluvial soil, which rests upon what is called a bed, a subsoil, of clay. Sometimes a stratum of sand or gravel, several feet in thickness, may be interposed between the two above-mentioned layers, masking to the eyes of superficial observers the real character of the ground. Whatever the nature of the uppermost layer or layers, provided there be a subsoil of clay thick and tenacious enough to prevent the passage through it of water, and the level position of the clay-bed be such that the water cannot run off, the soil will be a damp and also a cold one.

We can readily understand that such a soil, always moist, always perspiring under the influence of solar heat, must keep the superjacent air ever full of moisture, and must predispose to such disorders as rheumatism, gout, etc.; but the method in which it can actually breed certain germ diseases, such as diphtheria, demands some further explanation.

The upper layers of all land contain vegetable or animal organic matter in a state of decomposition—*i. e.*, loaded with bacteria more or less developed, according to the pabulum on which they feed, the amount of air or moisture in the soil, etc. Now, in a dry soil the rain-water passes through this layer, carrying *downwards* all such animal life. In a damp soil the moisture from the upper sodden layers has to reappear shortly in the form of perspiration from the ground, and such perspiration brings up with it many of these bacteria. Much will depend upon the atmospheric conditions whether these bacteria develop further, or remain as they are, or die. During summer heats they apparently undergo changes which convert them to the germs of English cholera and of dysentery; in damp, cold, stagnant atmospheric states into the germs of diphtheria, croup, pneumonia, etc. We all know

how certain places are insalubrious at certain times of the year.

But a clay subsoil need not always be equally a damp one. If the drainage be deep and good, or if the clay bed slope, much of the surface water will be carried off, and the soil will be drier. Some clays are, again, more impermeable than others—that which underlies a large portion of London is less tenacious in composition than that found so extensively in the eastern counties.

We have seen that either gravel or sand may overlie a bed of clay; but, independently of this state of matters, a low-lying gravel soil near a large river is to be always strongly suspected, for such is often sodden with water and far damper and more dangerous than the worst clay soil.

Speaking generally, a chalk subsoil is the best and driest, next in order coming gravel and sand, and then a sloping, well-drained clay bed.

We must content ourselves with this very brief survey of a large subject, and pass on at once to inquire what are the effects on man of much moisture in the air.

Dry air is a bad conductor of heat, moist air a good one; a dry, cold air has therefore far less effect on the body, and is much more easily borne by it, than a moist one of equal temperature. A warm, dry air favors perspiration, and induces a high state of assimilative activity in the body. A warm, moist air checks tissue change, and thus, other conditions being equal, tends to produce both lethargy and to favor increase in weight. Thus, formerly, warm, moist airs were in repute for all wasting diseases, such as consumption, but at the present day less warm, but drier, airs are recommended, and are found indirectly, by increasing the vigor of the bodily functions, to conduce in such diseases to an increase in bodily weight, as well as to bodily vigor.

Sir James Clark deliberately says: "Of all the physical qualities of air, humidity is the most injurious to human life." Prostration of strength, depression of spirits, a wearying heaviness, deficient appetite, and disinclination to bodily and mental vigor, are the symptoms which are complained of by those who, unsuited to such air, are compelled by force of circumstances to reside in a humid atmosphere. Those of the nervous and sanguine temperament are, however, often fairly well in damp, relaxing airs; the gouty, the rheumatic, the bilious, the lymphatic of temperament, are generally the worst sufferers. Innumerable diseases have been ascribed to a moist air; some are actually generated in the damp soil; some are merely favored by the presence of much atmospheric moisture. Rheumatism, gout, heart disease, bronchitis, pneumonia, pleurisy, hypochondriasis, dysentery, diphtheria, typhoid fever, puerperal fever, and even cancer, have, each and all, by eminent medical authorities, been traced to the influence of damp. Such sweeping assertions must, however, be received with caution, for it is only on those whose corporeal conditions demand a dry air that damp can tell adversely, and, as a matter of fact, large and healthy populations cover some of the dampest soils in England.

Finally, it is well to note that much will depend upon the construction of his house as to whether the resident on a clay soil will become painfully aware of the moisture that it holds. The well-built portions of the west of London that rest on clay are, if relaxing, still wholesome, while the extensive areas in the same district, covered by the works of the jerry-builder, are infested with, among other complaints, diphtheria in cold weather and English cholera in hot weather, firmly established as epidemic disorders.

Force and Direction of the Air Currents.—As most of

my readers already know, winds are produced by the unequal heating of the air in different parts of the earth, and are, in fact, magnified draughts.

Passing over the foreign windy celebrities, such as the Föhn of Switzerland, the Khamsin of Egypt, the Sirocco of North Africa and Southern Europe, the Bora of the Adriatic, and the Mistral of the South French coast, we have but space to say, in reference to the winds that visit Great Britain, that the north wind is moderately dry, and for obvious reasons nearly always cold; the east and northeast winds are cold and dry in the winter, hot and dry in the summer; the south wind is moderately warm and usually dry, while the west and southwest winds, coming over wide ocean tracts, are warm and moist, especially in winter, and as the air of the land is cooler, large part of their moisture is condensed into clouds and rain, much latent heat being liberated in the process. To this influence is traceable the warm wet winters of Ireland and of the western shores of England and Scotland.

III. *Habits and Modes of Life.*

That these have an important bearing on individual health, and therefore furnish the physician, when wisely and cautiously used, as levers in re-equilibration—*i. e.*, in the restoration of health—no one can doubt.

Spite of such authorities as Drs. B. W. Richardson, Parkes, De Chaumont, Wilson, and Farr, whose names are familiar to all who dip into the subject of general sanitation, there are very few unhealthy trades and occupations. These authorities often fall into the fallacy of dealing with the average man, the standard man, and their researches have therefore usually no practical bearing on individual health, and are worse than useless for the purposes of the general physician. It is of the nature of a

truism to say that no two men are alike, and to surmount this always exceedingly great obstruction to the laying down of rules for health guidance, and to give to what should be, what can be, but general directions, the weight of dogmas, the civil hygienist (and the therapeutist) rig up the average man, a subjective *homo*, who, inasmuch as he has no existence, demands no treatment. On the other hand, the military medical hygienist views all men as soldiers; the efficient soldier is the standard by which he would measure all his fellow-creatures. The penitentiary doctor takes capacity for oakum-picking and for treadmill exercise as his standard, a point of view that is unimpeachable as long as convicts are in question, but which can form the basis of no guide to the general health of mankind, to whom, however, he can rarely resist the temptation of applying it. The statistician tries to deduce a moral, on insufficient premises, as to the danger attendant on many trades, but practically he knows little if anything of the main factors that go to elevate the rate of mortality in them. It is much more often the low rates of pay, the temptations to drink, and the drafting into occupations of men who have lived under totally different conditions, that tell on the death-rate, and which are practically all unpreventable, rather than some casual and preventable risk of lead, or other metallic, poison. The sole condition of health is, as Darwin long since, but in another connection, expressed it, "correspondence with the environment," in other words, a power of acclimatization, of bodily adaptation, to the special surroundings of every-day life; and for this condition to be secured there must exist, as I have in an earlier chapter stated, three necessary conditions: a body sufficiently ductile, sufficiently plastic to take, without destruction of any vital part, the impressions of the new mould in which it is to be cast, or by which it

is already surrounded, and as a rule in youth only is this plasticity very great; secondly, the moulding process must —if the new mould be very different from that in which the man is already cast—be always slow, and the less plastic the body the slower must be the operation; thirdly, the limits in the process beyond which no bodily structure can go, at least in the span of an ordinary lifetime, must be remembered. If, for example, you take a middle-aged farmer, and place him in a bookbinder's shop in central London, he will begin to suffer at once from ill-health, and he will probably continue so to suffer for years; his body is, as I explained when speaking of functional derangement, constantly influenced by unusual forces in his surroundings, constantly oscillating beyond the regular limits of health, seeking ever to balance its new conditions and never succeeding. "Ah!" the hygienist will say, "you have placed him in an unhealthy employment, *vide* Dr. Farr's tables." But what about his fellow-workers, born cockneys? They are thoroughly well. Spite of their white faces and thin hair, their expectation of life is quite up to Dr. Farr's standard. Let us take one of these latter, a bookbinder of many years' standing, put him in the farmer's old country residence, set him to the work of farming, and visit him a week or two afterwards; what shall we find?—that he is brimming over with thankfulness for an increase of health, of spirits, and of bucolic virtue? Not at all; he will tell us that he is not nearly so well. The dullness and lack of companionship are, so he will tell us, killing him, and the exposure is already crippling him with rheumatism; in fact, the bookbinder's body is experiencing all the throes which accompany an attempt at equilibration with altered surroundings, and these may last for years or even never cease, everything, as with the transposed farmer, depending upon the adapt-

ability of the body and the exact nature of the environment.

When we approach the third condition to a successful acclimatization—namely, attention to the limits within which alone the body of man is plastic, we first see our way clearly to speak *within very narrow limits* dogmatically of a few trades and occupations as essentially unhealthy. We know of no process of moulding, however slow, which can accustom the body of man to the absorption of much lead, mercury, antimony, or zinc, nor of any that can make the fumes of sulphurous acid or of nitric acid, or an air laden with coal-dust, or with fine particles of hair, feathers, etc., factors of health. Yet even in the trades where workmen are exposed to such influences, the exercise of care can minimize the danger, and a large amount of tolerance of these conditions is established in the bodies of those long exposed to their influences.

And what we have said of occupations applies even to habits. There are, spite of the alarmists, few essentially bad habits. If we take such a habit as smoking into just consideration, we find ourselves unable to pronounce a general anathema against it. The anti-tobacconist will, indeed, seek to dismiss the subject with what, to his mind, will seem a valid and conclusive reason against the practice. "Smoking is clearly unnatural," he will tell us, "and therefore ought to be discouraged." But when we ask him to define what he understands by unnatural, we detect the flaw in his argument. The fact of the matter is, that the word natural has, except in wide limits, no fixed and constant value whatever as applied to man; that only can be condemned as universally unnatural which, as far as human experience goes, Nature will tolerate in *no* individual, that which is inconsistent, in every known instance, with health. We know that an habitual

consumption of mercury, of lead, of copper, of iron, and of many other substances, renders, as far as human experience teaches, the maintenance of the steady balance of health impossible, but this cannot, by an impartial judge, be affirmed of the systematic use of tobacco. That many persist in the habit of smoking, notwithstanding the evident fact that it is injurious *to them*, no one can doubt; but this may be said equally of all habits, even of the simplest and of those most generally commended. And what is true of smoking applies equally to the habit of taking alcohol. It is only when a certain limit—varying in each individual—is exceeded, that the practice becomes injurious and will deserve our condemnation, while, up to that point, tobacco or alcohol may become, may be, an actual factor in the maintenance of health, a factor which, if the body be aged or deranged, and therefore slow at equilibration, cannot be suddenly dismissed, under the penalty of more or less severe derangement of health. I may even proceed still further and state that which will be borne out by all medical men of experience in the line, that loss of general health, evidenced by digestive failure, derangement of the heart's action, muscular weakness, and, above all, by prostration of the nervous system, is the consequence of the sudden *discontinuance* of habits and modes of life which are distinctly *contra bonos mores*, and, for the latter reason, and that only, intolerable, and to be discontinued even were life itself to be the sacrifice.

The question of clothing, which belongs to the department of habits and mode of life, I shall deal with, practically, in the second part of this book.

A few words by way of conclusion. Our first duty in undertaking any treatment is to comprehend the significance of the phenomena of disorder, and then to study the environment—to be found in the conditions of life—

of the sufferer, for this environment is the mould in which the man is cast, and which lends itself readily to such alterations as may be required for the good of the invalid. The process is simple, but requires some thought, some judgment, often some strategy and skill. In the first place, the past physical history, family and personal, has to be learned. This supplies us with data for the estimation of the original form of the mould from which the individual has issued, that in which he was well, and to a return to which it will, in most cases, be comparatively easy, and nearly always beneficial, as nearly as possible to revert. Inquiries into the medical history also bring out the existence of certain constitutional taints—gout, insanity, etc.—of which otherwise we should possibly have remained completely ignorant, and which, in a latent state, may be at the bottom of much mischief. Then the plasticity of the body of the patient has to be gauged. This will depend on his age, on the presence of structural disease, on the rate at which he has been spending life, for there is sound philosophy in the French adage, "L'homme a toujours l'âge de son cœur," which teaches us that a man may be gray at heart when few summers have passed over his head, or, conversely, be old in years and young in strength and vital energy.

Having thus arrived at as correct an estimate as is possible, in the circumstances of any given case, of the sum and the distribution of the forces of the invalid's body, and having considered the various agencies which have brought about the present physical derangement and the part played by each one of them in the process, we turn to the three great measures which I have discussed for means of relief. All of them will often require to be pressed into our service. This caution is necessary, for even the fair and open field of hygiene, that in which it might have been

imagined no guide but common-sense would have been tolerated, is infested with those pseudo-pilots of medicine—the one-idea men. These "worshippers of detached ideas," as Professor Bonamy Price would have called them, stumbling against a fragment of truth, would have us to cling to it alone for physical salvation, to the ignoring of all else. Such are the men who are going to regenerate humanity by means of diet only, or of climate, or of electricity, or of massage, or of faith in hysterical religion. They are conscious that there is truth in their means of cure, but they fail to see its limit. They are ignorant of, or they shut their eyes to, the one great physical truth, that the body of man is the equation of *all* his surroundings. Not on one power alone in these surroundings, to the exclusion of all others, can reliance alone be placed, but on a wise and skilful combination of all of them. Again, the various theorists of this order are not even agreed among themselves as to the ideal man; the one recognizing great capacity for mental work as the standard of perfection, another the virtues which go to form the athlete, another those which mark the moral and religious man.

I have now completed my very short sketch of the three great every-day moulders of mankind—diet, climate, and habit. It is evident, provided the exact nature and the extent of any malady be determined, and the body of the invalid be not already partially destroyed by structural disease, that these great agents, wisely moderated to suit the exigencies of each case, will be equal to its relief and cure. In the darkest ages of superstition this fact has always been recognized by a chosen few, and at the present day, though rarely acted up to, is never seriously contested. Why, then, is recourse had so often to the extraordinary measures, drug action, powerful and unnatural

mental influences, etc.? Mainly for two reasons: the first being that the means of cure by ordinary measures are often out of reach of the sick man or not according to his inclination; and the second, that there is even now a considerable hesitation, even in high scientific quarters, in throwing over the old belief in the supernatural causation of disease, and a belief in this is inconsistent with an honest reliance on the every-day, common-sense methods of cure.

Certainly nine tenths of the sick people one is called on to treat think they discern in their disease the hand of the Almighty scourging them for some moral defect, and not, as it should be, and is, his hand leading them, by the operation of natural laws, back from physical transgressions and their certain consequences, to the enjoyment of health. Only when it has come to be recognized, and the main object of this book is to teach it, that the latter is the real solution of the problem of disease, will natural remedies receive their full share of popular reliance; and even then extraordinary measures, such as drugs, though occupying a subordinate position, will not be completely discarded, for they, as I shall attempt to show in the next chapter, find a place, by no means unimportant, in a scheme of scientific and rational medicine.

CHAPTER V.

THE PRINCIPLES OF SCIENTIFIC MEDICINE

(continued).

TREATMENT BY EXTRAORDINARY MEASURES.

Extraordinary measures are called for in treatment, because extraordinary combinations of forces are relied on in health by civilized man. Medicines may act in any one of the following ways: (*a*) as foods; (*b*) as elements of disturbance, of which nature are stimulants, tonics, and alteratives; (*c*) as mechanical scavengers; or (*d*) as antidotes. An instance of the treatment in a case of gout. The fallacies of the orthodox drug system: (*a*) its assumption of the possibility of local disease; (*b*) its pretence to possess drugs that act only locally; (*c*) its wrong inductions; (*d*) its misinterpretation of the phenomena of disease, and consequent misapplication of remedies. The only rational lines of treatment. Physico-mental agents. Structure of the nervous system and method in which it, and, through it, the whole body, is affected by these agents.

CHAPTER V.

THE PRINCIPLES OF SCIENTIFIC MEDICINE

(continued).

TREATMENT BY EXTRAORDINARY MEASURES.

"The day of orthodoxies is over; the day of real science is only just dawning. Enormous evils have accrued to humanity and to the medical art from a blind reliance upon the traditions of the ages, and often upon traditions wrongly interpreted. . . . The physician of the future will do well if he remembers always the pernicious despotism which has been exercised over his own art by the fetters of these dead orthodoxies, and will therefore be very slow to acknowledge their claim upon him to any more than an historical regard."—Professor GAIRDNER (*Presidential Address on Medicine at the British Medical Association's Annual Meeting in August*, 1888).

"La médecine aurait donc besoin d'être soumise à une critique analogue à celle que Kant a fait subir à la philosophie. Par cette opération cruelle sans doute, mais en définitive salutaire, elle perdrait beaucoup de ses prétensions ambitieuses et de ses droits usurpés, mais elle verrait clair dans ses affaires et pourrait vivre avec sécurité et honneur."—LOUIS PEISSE.

"True science is perennial; systems of science are perishable. Science belongs to mankind; a system only to the time and circumstances which have begotten it."—HUFELAND.

TOWARDS the conclusion of the last chapter I hinted that in the actual conditions of every-day civilized life, circumstances may and do constantly arise which warrant a recourse to various forces of Nature, differing often so far both in intensity and in character from those to whose influence mankind is commonly subject, as to deserve the title, when applied to man in his physical distresses, of extraordinary measures of treatment.

But why should man, born of, and ever environed by,

the ordinary forces of Nature, seek aid from combinations of force apparently foreign to his economy? Such, in condensed form is the plausible argument of a school ycleped hygienic, that professes to worship Nature without apparently having any adequate comprehension of her ways. *Man is not a constant quantity*—and this truism cannot be too often reiterated—but each individual of the race, while preserving a general common likeness to all its other members, is compounded of forces infinitely diverse both in arrangement and in relative amount. We allow ourselves to be deceived by appearances, and because the North American Indian and the Englishman agree in their number of limbs, in their mode of progression, and in the possession of certain special senses, we call each a man, and then unconsciously assume them to be practically in all respects equal in their physical attributes. It is only when we surround the noble savage with what, *to us*, are the great blessings of civilization, because they have become a necessary part in our environment, and remark how the darker race pines and dies, that we begin to comprehend that these men, so similar to us in the contour of their bodily structure, demand, for continued health and vigor, surroundings in life widely different from our own. The savage, accustomed to face and to battle with untamed Nature, languishes in civilization just as do flowers and shrubs rudely translated to new soils and fresh climates. Physiology knows no rigid ideal; that only is best for the health of the individual which his body is best fitted to balance; each body has been produced, and is maintained in health, by a separate mould, and the shape of that mould cannot in any direction be suddenly altered without throwing the whole contents, temporarily or permanently, out of balance. Health, then, is an equilibrium with special surroundings, varying in the case of every man, not, as the

hygienist would have us believe, conformity with some ideal environment. The European of the nineteenth century has long since ceased to be a child of Nature; for the maintenance of health he demands what, from the point of view of the savage, are extraordinary conditions, and for the relief of physical suffering he may, therefore, for very sound reasons, look also for extraordinary remedies. That the latter have become discredited is due only to their misapplication, and to a misinterpretation of the phenomena of Nature as observed in disease.

All extraordinary measures of treatment may, for the sake of convenience, be divided into *medicinal* and *physico-mental.* This division is purely an artificial one, for the only essential difference between the two varieties lies in the channels through which they act on the body, the medicinal selecting generally the blood system, the physico-mental the nervous system exclusively.

The methods in which medicines act may thus be summarized:

The human body consists, as we know, of cells which receive and store the energies derived from food, which food, in the form of blood, is ever circulating in our tissues. The cells of the separate organs, moulded variously by the conditions which surrounded their growth, differ, for reasons already fully explained in our first chapter, not only in external outline, but, by virtue of that colloidal character which permits of their interior being permeated and moulded by crystalloid material in solution, also in actual chemical composition, and being thus endowed with different chemical affinities, they abstract from the blood-current different materials and hence perform different functions. If, therefore, you introduce into the blood-current soluble crystalloids, such as are the vast majority of our drugs, it is clear that not only will they act

upon each and every cell, but that they will act in a very unequal manner on the various groups of cells, the so-called organs.

We will now briefly discuss the drug system, and seek from the tangled mass of medical creeds to arrive at something like a correct conclusion as to the limits within which the employment of medicinal agents is commendable.

Medicines.

Medicines, when taken internally, act, then, in almost every case by way of the blood-channels, and, mixing with the blood-stream, are conveyed with the food to *every* portion of the body.

Now we know that the cells of the different organs of the body differ in chemical composition (*i. e.*, in the arrangement of their constituent molecules), and, according to the chemical affinities existing between them and the foods presented to them, so do they act more or less according to chemical laws on that food. Precisely the same occurs in the case of medicines.

By the light of these simple facts let us see in how many ways medicines can act on the cells.

1. *As Foods.*—We possess no known medicinal compound which can merit the name of a real tissue-food or in any way replace albumen.

It is true that, in caffeine and guaranine, we have complex nitrogenous bodies which exert a marked influence on the body, and that phosphorus—an element having in its chemical attributes some relationship to nitrogen—has been vaunted as a nerve-food, but these drugs, and others of the same class, cannot be administered, for any extended period, without producing obvious mischief, and therefore cannot actually be classed as substitutes for, or even as real adjuncts to, our natural tissue-food, albumen.

Popularly classed as medicines we possess, however, some very useful fuel-foods. Cod-liver oil and the various fatty emulsions are of this nature, to which also belong the so-called malt extracts. Many of the lighter wines and the malt liquors may also find a place under this heading, though their action on the body is, unlike that of the pseudo-drugs just named, not purely nutritive. Necessary salts that have been omitted from every-day food are sometimes administered as drugs and spoken of as substances alien to the body, though they cannot really be viewed in that light.

Thus many salts of sodium, potassium, ammonium, magnesium, lime, and iron are natural constituents of the human frame, and the necessary amount of each is represented, though we may be unconscious of the fact, in our common articles of diet. Sometimes, however, especially among the rich, who prefer the finer varieties of meal, which contain too small a percentage of these salts, it becomes very necessary to order by themselves, and in the form of medicine, these preparations. Great good may thus be effected, but the dose of the salt must never be too large in amount, and it must be administered in a great deal of water. This is the secret of the great success in gouty states of such very weak mineral waters as those of Contrexéville and Kronenquelle, and of many others, and of the evil wrought by large, concentrated amounts of the *same salts* when obtained by prescription.

Under this heading of foods, we may also rank certain artificial digesters of food, of which pepsin, trypsin, pancreatin, and malt are familiar examples. Their field of utility is very restricted. When of the best manufacture, and administered with correct knowledge of the conditions under which alone it is possible for them to act in a desirable way, they digest artificially certain foods, but this

only franks these foods through the wall of the stomach or intestine ; it can do no more, and, as physiology tells us, this is but a fraction of complete digestion. It is, moreover, demonstrable that they can only do this when the general bodily health is fairly good, a state of matters in which they can rarely be required. In the presence of any marked gastric or intestinal derangement, such as is present in febrile states, they are ofttimes administered by the ignorant with a view to circumvent the beneficial blockade which Nature has established at those many mouths of supply of the circulation situate in the stomach and bowel, but, fortunately for the patient, such attempts usually fail.

II. *As Elements of Disturbance*, in respect to the ordinary cell functions. Most of this class act as *stimulants*, their effect being more marked on some tissues than on others. Alcohol, chloroform, ether, opium, Indian hemp, etc., are examples of such acting in various ways, but always mainly as stimulants, on the nervous tissue, their stimulating action on the cells being, more or less, speedily followed in every case by a species of arrest of function. We do not wonder at this result when we remember that a stimulant does not, cannot, generate energy, but can only liberate that already stored in the cells. It can, therefore, only leave behind a state of cell exhaustion. Each of the above stimulants selects by preference—really by chemical affinity—a certain portion of the nervous system, but they do not, as we know, leave the other portions of this system or of the general body unaffected, though these collateral effects are often masked by the more striking nervous ones. Then we have the large group of so-called *alteratives*, under which heading the orthodox therapeutist ranks any drug that will disturb the economy, and recommends it to be administered in obscure diseases on

the off-chance that a better condition of health may, after a general concussion, make its appearance. Then comes a large group of slow stimulants, which, according as they act most conspicuously on any one part of the body, are said to tone that part, and are called *tonics*. There is absolutely no place in the economy of man's body for a drug, unless it be a food that acts as a permanent restorer of health and tone, for practically that is what the therapeutist wishes to be understood by the word tonic. Iron is either a food or a poison according as it is administered, quinine is probably a food,* while many wines and malted liquors, phosphorus, caffeine, etc., are, in varying proportions, foods as well as stimulants. Digitalis, strophanthus, nux vomica, strychnia, and vegetable bitters are, in their ordinary dosage, examples of slow stimulants, and their use is attended by that fatal but inevitable drawback attendant on such stimulation—viz., subsequent exhaustion, which manifests itself most, but *not solely*, in the organ, the cells of which have shown the greatest affinity for the drug. It is true that the unfortunate patient will but rarely attribute his eventual breakdown to the drug-stimulant upon which he has been relying for help, for he is quite ignorant of what the course of his malady would otherwise have been, and he is, therefore, not in a position to trace cause and effect; but any skilled physiologist will assure him, with me, that a tonic is a mere therapeutist's day-dream, a scientific absurdity, and any intelligent man who has had experience of both the orthodox and the expectant systems of treatment can also assure him that recovery without the use of

* An alkaloid resembling, if not identical with, quinine, exists, according to Drs. Dupré and Bence-Jones, normally in the liver and other animal organs, and, according to Dr. Lauder Brunton, near allies of it are found, in considerable quantity, in the human intestine.

tonics is more prompt, and, above all, more lasting, than that apparently favored by the use of these agents.

I have said that there are some members of this group which, from their extensive range and their rapidity of action, may be called general stimulants, while there are others which show a preference, a chemical affinity, for some one or more organs only, and act much more slowly. There exists yet a third variety, whose action is such that one of the several functions of the cells in an organ only is stimulated, while the others are more or less unaltered. Take an example. The liver cells have each three or four important and very different duties to perform, yet we possess drugs that can increase temporarily their power of bile-making, while leaving their other functions *in statu quo*. The members of this last subdivision of stimulants are numerous and important, but are perhaps greater disturbers of the general economy than any others, and require to be therefore used with the greatest wisdom and discretion.

III. *The third Group, which act as Mechanical Scavengers*, is a small one, and it must be confessed that nearly all its members belong more or less to the class just named, that of local stimulants. Castor oil is the best example of a drug whose action is almost purely that of an evacuant acting on the intestine, and water consumed in such large quantities as to merit the name of an extraordinary remedy, perhaps our only example of one that acts on the urinary and cutaneous system in a like simple manner.

IV. *The fourth Group consists of certain Antidotes to Poisons.*—But what is a poison? It is that quantity of anything, be it popularly viewed as food or drug, which will act deleteriously on the human body. Thus common salt and the most prized of our fruits may, when consumed in excess of our needs, act as violent, or even as fatal, poi-

sons. Under the heading of antidotes to poison may also be classed all drugs which destroy parasites, as also all chemical compounds which directly neutralize the effects of such dangerous compounds as arsenious acid, strong alkalies, acids, etc. It is much to be regretted that we possess not one single drug that has the power, without killing the patient, of destroying the fever ferment which has entered the blood-stream. Perhaps this is not to be wondered at, since we are not as yet quite certain as to the identity of the special poison in each case. Quinine was long thought to be such an antidote, but its title to such a claim is, for reasons already given, open to serious doubt.

Such being the divisions within which all medicines that can produce any effect whatever on the body of man are susceptible of being ranged, I will now very briefly sketch the plan upon which they should be administered, and will then show to what depths of absurdity partial experiments, a blind reliance on tradition, prejudice, and infamous logic have sunk the orthodox therapeutist lights of the present day.

Let us hark back for a moment and imagine ourselves in the presence of an invalid suffering from a mild attack of gout. We will also, for the sake of simplicity, suppose that all the organs of his body are, for his time of life, structurally perfect.

In gout we have in the first place, as prime cause, a liver that, as the result of overwork, of congenital weakness, of debility in its nerve supply, or most often of all of such causes combined, has broken down in one of its main functions, the making of urea. As a direct result of this breakdown, uric acid, a less oxidized substance than urea, a kind of half-formed urea, appears in large quantities in the blood.

Like the urea which it in part replaces, uric acid must

pass out of the body by the kidneys. If these organs are in good condition, they strain it off rapidly, and if present in large quantities, it will appear in the urine as sand or gravel. If the patient continues his usual course of life, and the kidneys remain functionally active, this sand will, at short intervals, for a long period of years, make its appearance, though there is ever present the grave risk that some of it may be retained in the kidney or bladder and form the nucleus of a hard stone.

In the vast majority of cases, however, the excretion of uric acid does not keep pace with its production, and as a result the uric acid accumulates in the blood. Now commences to be manifested a host of symptoms—all of them endeavors by the body to cast out the offender—two or three of the commonest of which we will refer to. The surface of the stomach inflames, in other words, gastric catarrh sets in; the patient's appetite, and indeed his power of retaining food, are both arrested, the supplies of nitrogenous food, from which uric acid is formed, are cut off, and the kidneys are thus afforded time to deal with the poison whose production has hitherto exceeded their powers of elimination. More than this, however, occurs: the heat of the inflammatory action going on in the stomach wall helps to convert the uric acid in the blood to urea, and this process is further favored by the oxygen in the blood, which, finding an insufficiency of fuel-food, readily assists in the oxidation of the uric acid, which, oxidized, becomes urea.

As there is no difficulty in the excretion even of large quantities of urea by the kidneys, it thus happens that in two or three days the excess of uric acid which has set up the symptoms will be expelled the blood-current, and health will return.

Instead of the stomach one or more joints may become

inflamed. The sequence of matters is, however, still the same, the loss of appetite and the inflammation leading directly to a cure. In other cases, in place of either the stomach or a joint, the external skin will take on the inflammatory action, and patches, more or less extensive, of acute eczema will be seen. The chain gives way at its weakest link, and the least healthy, or most overworked and exhausted, organ of the body will be the first to hang out the signal of distress; but the process of cure thereby induced is in all cases the same.

It is scarcely necessary to indicate the lines of treatment, so obvious must they be.

(*a*) We cut down at once the supply of albumen, the nitrogenous food from which comes uric acid, to the least possible dimensions, and we further advise the patient to be always in the future exceedingly cautious not to consume, in any but the least quantities compatible with health, this form of food, and we do wisely to add the caution that all combinations of food which usually cause distress to a weak stomach will deleteriously tell on the gout. We furthermore give a smart purge to stop at once the further passage of supplies of albumen to the liver by emptying the stomach and bowels. Lastly, we order an alkaline salt, as uric acid robs the blood of alkalies by forming compounds with them.

(*b*) We try to wash out the surplus uric acid by giving large draughts of water, and we may administer some drug that excites the kidney, already excited by the presence of the excess of uric acid, to further action.

(*c*) We enjoin rest to the inflamed organs, and we increase the amount of heat already present in them by the application of poultices, or we prevent the radiation of heat from them by means of cotton-wool or flannel.

(*d*) Sometimes, so acute is the pain, we are forced to

cut short the attack by a few doses of a potent and special liver stimulant, colchicum. This practice is, however, as all gouty men know, not a commendable one, for the present benefit is purchased at the certainty of a return of the attack more speedily than would otherwise have been the case.

Such, with a few general hints as to the avoidance of worry, and a possible change of climate, together with a short inquiry into the patient's habits and mode of life to ascertain if in them is to be found any cause directly provocative of gout, complete our indications.

We have thus in the one complaint presented to our view the great truths that underlie the scientific and rational use of drugs.

We administer a needed food, an alkaline salt, while we suppress the further supply of unnecessary ones. We use, in the form of a purgative and of water, useful scavengers. We *favor the symptoms of disease, as far as is possible*, by means of drugs. We do not try an antidote, because we do not possess one, and if, in a weak moment, we have recourse to a stimulant (colchicum), we regard it, with wisdom, as only a doubtful friend.

From this example we learn that people who live under the extraordinary conditions of civilization, in an environment which is not that of man in a state of nature, are justified by their own reason in having recourse to certain extraordinary agents in their search for the means of recovery, more especially if they have first made a satisfactory trial of ordinary means and have found these latter unequal to the occasion.

Do I then consider that the British Pharmacopœia and the various standard commentaries thereon are safe guides, and that, when the Darwin of the future shall have regenerated medicine, these books will still occupy an honored

place? Not for one moment. There is not one of them that is not a mine of fallacious reasoning, while in the one or two that, discarding a mere dependence on written and oral tradition, attempt to support their drug system by an appeal to experiment, the proof in every single case completely fails because of the striking incompleteness of the experiment. I will briefly indicate one or two of the flaws patent to even the least learned of the readers, and which vitiate the conclusions arrived at.

First of all, and on every page of such works, the existence of purely local disease is assumed. Now, it is scarcely necessary to inform the reader that if there is one fact in physiology which is established beyond all doubt, and the truth of which is universally accepted, it is that all the parts of the body are absolutely and perfectly interdependent. They are not, of course, all of equal importance to the economy, but not one derangement, however insignificant, is conceivable which does not react on the whole economy, or which is not, as is more frequently the case, an expression of a general disorder of the body. It is true that the existing general derangement cannot always be submitted to ocular demonstration. Medical men often have presented to them skin affections of very limited area. When the patient is questioned as to his general health, he replies that he is exceptionally sound and well. No physical examination may be able to shake this assertion; the microscope may fail to show in the blood the very faintest sign of disorder, and yet the skin disease will often tell, more plainly than could words, of a constitution rotted to its last fibre by scrofula, syphilis, or other constitutional taint.

Having assumed the existence of strictly localized disease, the therapeutist almost naturally passes on to another assumption, equally at variance with all scientific research,

of the existence of drugs whose action is also purely local. I have said that drugs, like foods, have *more affinity* for one organ than for another, but even if it were possible that any medicine, after in some way modifying the constitution, and, then of necessity, the function of one organ, could then pass straight out of the body without producing the least action in its transit on any other tissue, even in such a practically impossible case, the changes set up in the affected organ would react on the whole body.

In all fairness it must be admitted that the therapeutist will state—as far as medical knowledge goes in this matter, which in the case of no single drug is very far—the collateral effects of the administration of a given drug, but even then he proceeds usually to recommend the use of the drug for the relief of *one* of the indications only. Let me take as example a familiar drug, tobacco, and, opening the last edition of perhaps the best-ordered therapeutic guide-book of the day, we will see what the author has to say about its action and uses. Tobacco is stated to act a little (in what way is not mentioned) on the brain; to excite the spine; to lower the functional activities of the motor nerves; to contract the pupils of the eyes; to be injurious to vision; to lower the temperature; to produce cardiac irritability; frequently to cause dyspepsia, and to possess a slightly purgative action. Then follows, side by side with the last remark, this extraordinary sentence: "Moderate smoking as a rule aids digestion by acting as an aperient." Great heavens! an aperient action aid digestion! Digestion a purely local business! Why, if there be one process of the body, in the completion of which every organ is concerned, and the nervous system most of all, it is digestion. That a drug which runs amuck in the ways described among the bodily organs should work anything but disaster in the digestive

function is inconceivable and ridiculous on the very face of it. But apart even from this fatal flaw, another and a deeper error traverses the whole article on tobacco, one to which I have more than once referred as the fallacy of the assumed ideal standard. The writer of the article has had before his mind's eye an ideal man with ideal organs and with ideal surroundings, and his whole book, as indeed all modern works on therapeutics with which I am acquainted, is written for, and true only in the case of, such a purely imaginary being. The real facts, as regards tobacco, are that there exist many men for whom tobacco is one of the ordinary every-day forces in their environment, one which their bodies have become accustomed to balance, and one which has therefore become an element in their actual maintenance of health under the conditions in which they live. If they discontinue its use their bodies actually become a little deranged for a short time, and until accustomed to the want of it, because one power, though a small one, in *their* health-producing surroundings is lacking, just as people unaccustomed to the effects of tobacco experience discomfort on commencing its use, because a new power is *added* to the accustomed sum of forces in their life. Such are a few of the outrages on the human reason, a dozen samples of which may often be found on a single page of a modern treatise on Materia Medica.

I have said that experiment is often pressed into the service of the therapeutist, but two grave errors invalidate the results which one might have looked for from a promising method of investigation. Firstly, the experiments are made nearly always on the lower animals, and, secondly, they are too partial to warrant the conclusions drawn. As to the first of these objections I have not much to say, nor do I view it as a disturbing factor of sufficient weight

often to invalidate the results, inasmuch as there is oft-times ample evidence of a close similarity of action between certain of the tissues in man and in the lower animals, though the habits and customs of men and animals, it must be remembered, are widely different, and to reason of the effects of meat or tobacco on meat-eating, smoking man from observations confined to the vegetarian, anti-narcotic monkey is scarcely a proceeding likely to advance science. But the partiality of the experiments, at least when viewed with their appended conclusions, is a much graver error, and robs them absolutely of all real value.

Let us take the largest book of the day on Pharmacology—and I omit purposely all names, as I am attacking an evil principle and not an individual—and in every one of the very numerous experiments recorded therein, one organ or one group or set of organs, or even a mere fraction of an organ, is singled out as the subject of a drug test, and from the results observed is drawn a conclusion as to the value of the given medicine in a disease affecting *the whole body!* But man is not a nerve, a gland, a heart, a pair of lungs, or a muscle, but a complete mechanism, each part of which lives and performs a certain function, which has no real existence and no useful purpose when viewed alone, but only when regarded as an essential factor in the maintenance of a certain general balance. Moreover, it is not explained—for the explanation, if full, would in the majority of the cases show a balance of utility against the drug, even in the special organ whose benefactor it is supposed to be—what are the collateral, and above all the secondary, the after-effects of each drug.

Sometimes, indeed, another method of research, quite of equal value with the last, is adopted. A selected drug is administered to perhaps a dozen individuals with some

one symptom. If this symptom improve in all, or in the great majority, of such cases, the drug is forthwith given out, *urbi et orbi*, as a cure for such. To take an example. Three or four years ago, with a great heralding of trumpets, it was stated that, in suppression of certain periodic female discharges, permanganate of potassium (the salt from which Condy's fluid is prepared) was eminently successful as a means of relief. But of the cases quoted it was soon evident that, in some, the suppression was physiological, and that, therefore, no attempt to interfere with it was justifiable; and apart from this error, which is such a common one in therapeutics that I shall presently have to refer to it expressly, on extended research, and after some millions of women had been dosed with this by no means harmless salt, it became clear that the zeal of the discoverers had carried them away, and that the drug was practically inert in the cases for which they had recommended it.

But even if the fatal objections to its credit which I have urged against the modern, orthodox, therapeutic creed could be explained away, yet a heavier charge would remain. Modern philosophy has demonstrated the relationship between man and his environment, and has shown disease to be a salutary process ; all symptoms and all groups of symptoms, and therefore all functional disease, to be of direct benefit in the restoration to health of the individual ; organic, degenerative disease being, as far as its lesion is concerned, a benefit to the race of man, which it purges of its least fit members, while its symptoms retard the fatal issue, making death more gradual and more easy to the sufferer. To this view many leaders in medicine have long since subscribed ; not so the therapeutist. To him a symptom acts as does the red rag on a bull ; down goes his head, and away, at all costs, must the

objectionable color. To him a constipation, a diarrhœa, a skin eruption, a heart that does not beat the regulation stroke, or that does not convey the regulation impression to the listening ear, a liver or a stomach that does not secrete up to a certain amount, are ever and always legitimate game. They must conform to an ideal standard, if twenty other organs fall, as a result, out of the equilibrium, and a drug stimulant suited to that end is selected; whereas the real treatment, if treatment be needed at all, should consist in an effort to increase simultaneously the power of all the organs, to elevate the general equilibrium, and this can be effected only by foods, by changes of climate, by exercise, and similar means.

Such are a few of the more striking fallacies of the orthodox drug system; nor is it difficult, by the light that their exposure sheds, to understand why this system of physic has become utterly discredited, and why educated men so often prefer to trust their lives in illness to irregular practitioners of doubtful honesty than to the orthodox physician. Long ago Adam Smith said that to the quackery of the orthodox faculty were due, in England, all other forms of quackery. As a matter of fact, any system of medicinal treatment, or none at all, succeeds better than the orthodox one. The people at large are unaware of the fact that curable disease cures itself, and, moreover, takes the readiest and best methods to attain that end. Ignorant intermeddling on the part of the sufferer with the process is the danger most to be feared; the impostor has, therefore, but to place the patient in surroundings favorable to his recovery, and these in most cases common-sense suggests, to occupy his time, and save him from the risks attendant on meddling with Nature, by giving him some pleasant and inert compound, and, hey presto! health returns, and the empiric reaps both reward and honor.

In vain does orthodox medicine protest ; her undoubted honesty does not save him from the humiliating failure that awaits all those who work on wrong principles.

It needs only that some one of our rising medical scientists should have the courage of his convictions, and should subject to clear and pitiless scrutiny the fallacies on which the present drug structure is built, and then, in the words of Peisse, quoted at the commencement of this chapter, "medicine, while losing many of her ambitious pretensions and of her usurped rights, would," in return, "see her way clear in her own domain, and could live with security and honor."

But it is time for us to consider, since common-sense authorizes an occasional recourse to drugs, on what lines and within what limits we should employ them. I can attempt only a very brief sketch.

In the first place, the *cause* of disease, which is an undoubted evil, should be sought for and removed. Some drugs of the antidotal class can meet, in many cases, this indication.

In the second place, whether the cause be persistent and irremovable, or has already been found and placed out of action, the *symptoms* of disease, being in their very essence of a beneficial nature, should be favored. This line of treatment imitates Nature, and expedites the end she has in view, the cure.

In the third place, while still imitating natural methods, it may in rare cases be permissible to open fresh channels of relief for her by raising artificial symptoms, similar in nature and kind to those already in existence, but in a part of the body where the mischief of ultimate destruction of tissue will be smaller than in the structure affected. A plaster or a stimulating liniment may thus often beneficially be used to congest or inflame the skin, and com-

pel it to share in the strain thrown on more deeply seated organs.

In the fourth place, stimulating drugs should be used with caution, and with due regard to the troublesome and often serious reaction which is attendant on their employment. Evacuants, such as castor oil, should be had recourse to also occasionally, but only in emergencies. Their action always partakes somewhat of that of stimulation, and their secondary effects therefore nullify often the primary and desirable purgative ones.

In the fifth place, the food-adjuncts, such as pepsin, and the drugs that partake of the nature of condensed foods, should be administered with due regard to the needs of the body, and not on the idle preconception that because natural appetite is lacking it is advisable to force it. There is no hard-and-fast line between foods ineptly given and agents popularly recognized as poisons.

Lastly, drugs should be had recourse to only when simpler means have failed, for the knowledge we possess of the complete action of drugs is too restricted to justify us in seeking of them what is, at best, but a questionable service. All potent drugs should be banished from the domestic medicine-chest.

The best test we possess, though it is by no means an infallible one, of the action of a drug is its behavior in a number of healthy individual men. This method of research was that largely relied on by the late Sir Robert Christison and many other eminent therapeutic authorities. All states of real health are closely alike, are all simply conditions of equilibrium, and the invariable effects of a given drug in health, when the experimentation is extensive, leads to some definite knowledge of its action, and furnishes at least some useful data for its exhibition in disease; whereas no two states of ill-health can be even

approximately identical, for loss of equilibrium is necessarily of all shades and degrees. Thus the latter method, the more specious and the more fashionable, is actually the less reliable of the two.

The Physico-mental Agents employed in the Treatment of Disease.

Before we advance, it will be advisable to sum up our position. The body of man can be influenced either in health or in disease, though the latter only of these states now concerns us, through the medium of two channels, the blood and the nervous system.

For the sake of convenience, we have divided our agents into ordinary and extraordinary. When a patient presents himself for treatment we generally turn first of all to the ordinary methods of relief, and if we consider it best to effect a change in his bodily state by acting on his blood system, we make what we consider the alterations necessary to that end in his daily food.* In many cases, especially those of chronic but slight illness, such a change, if wisely and judiciously carried out, meets all the indications for treatment, and health promptly returns, but in some cases, from various causes, it may partially or completely fail. The body, for example, may have been fighting hard for years against antagonistic forces, its gallant stand unappreciated by its owner, till at last, with its army of cells decimated, and the survivors exhausted or demoralized, it is forced to beat a hasty retreat, which may threaten soon to end in final and complete discomfiture. Such is the actual state of matters in many acute diseases that the physician is called on to deal with. There is absolutely no time to obtain aid from a mere

* It must be remembered that the blood is merely food in its final state of preparation.

change of diet, and a rapid alteration of environment is rendered by the patient's state impossible. Something must be done, and done quickly, to prevent death. The feeble cells are roused to renewed vigor by stimulating drugs, while unnecessary burdens are removed by purgative ones. Time is thus gained, and this is employed in endeavoring to relieve the pressure of the antagonistic forces, and, if this can be effected, the body may be able yet to hold out against dissolution, though figuratively at its last ditch, for many years.

But we may have presented for our consideration and advice an invalid whose dietary is perfection, and whose blood is, to all intents and purposes, pure. His may, moreover, be a case in which recourse to drugs is unadvisable, and, be it remembered, the sick man has, in any case, to pay very dearly in the end for the temporary accommodation derived from that source. In such an emergency we shall do well to turn our attention to his nervous system and investigate the daily impressions made on this. These latter are often inadequate to his bodily requirements, and we therefore advise that a new and stronger daily stimulus be applied, to which end we recommend a greater variety of scene, the company of cheerful friends, an occasional visit to places of amusement, and, possibly, change from monotonous, dreary, routine work to employment that calls for varied mental exercise, and that holds before the eyes of the worker some ambition, a something worthy to work for and to win. How many apparently utterly hopeless cases of chronic dyspepsia, or of long-standing and seemingly incurable mental depression, are set right by these means; how vast and interesting, but too often neglected, this department of rational treatment, and how great and lasting its successes compared with those of the therapeutist! Under the heading of the or-

dinary measures of treatment I have already spoken, in climate and habit of life, of some of those nervine remedies, those of the ordinary variety.

Let us now ask ourselves if we do not possess also extraordinary means of rapidly and suddenly acting on the nervous mechanism of man—in other words, if we cannot find agents whose action on this system is analogous to that of drugs on the blood-system. We shall see that we not only possess them, but that they are in frequent employment, though the simple methods by which they act are generally misunderstood. In order to render their action intelligible to the general reader, I must precede the enumeration of such extraordinary nervine remedies by a very brief sketch of the plan of the healthy nervous system.

The nervous system consists mainly of bundles of nerve cells, the so-called nerve centres, and of two sets of nerves, the one carrying impressions, sensations, *to* the centres, and hence called sensory or afferent (*ad*, to, and *fero*, I carry) nerves, the other carrying motor influence *from* the centres to the muscles and to the blood-vessels, and these latter are appropriately styled motor, or efferent (*e*, from, and *fero*, I carry) ones.

The impression made on the end of the sensory nerve travels to its centre, sets up certain changes in the cells there, and, as a result, causes an emission of motor energy* down the motor nerve, which either contracts the cells of a muscle and thus causes a limb to move, or alters the size, the state of contraction, in the cells of a blood-vessel, and thus leads to an increase or decrease in the supply of blood to a part, and, since the blood is the cell food, the material by union with which it performs its work in life,

* Each nerve cell is a storehouse of energy, which, like the heat-energy of the muscle cells, is derived solely from food.

consequently to an increase or a decrease in the functions of the part.

The number of such nerve centres is very large. There are hundreds scattered through the body whose function is nothing more than what I have sketched. Each one with its afferent and efferent nerves is as purely an automaton as one of the machines for supplying matches and sweetmeats to be seen at the railway stations. They are aptly called *reflex* centres, inasmuch as their sole function in health is to reflect impressions, and in response to a stimulation, a call, from any portion of the body, to send down by the motor nerve an amount of energy equal to such stimulation, which expends itself in dilating the local blood-vessels and thus temporarily increasing the local power of doing work. This, in brief, is the nervous mechanism by virtue of which all of our internal organs perform, without the direct interference, or, in health, without even the knowledge, of the brain, those manifold functions—breathing, digesting, heart-movement, etc.—which are necessary to life.

It must, however, be added that each one of the many reflex centres in the body is connected also, indirectly, with the brain, which thus becomes conscious of a sensation—pleasurable or painful—when the stimulating message travelling from any organ to its reflex centre is *in excess* of the ordinary. Thus, for example, though we are, in the ordinary way, absolutely unconscious of the incessant movements in the coils of the intestine, any indigestible article of diet will speedily afford to us a painful proof of their reality ; and, moreover, this sensation, going to the brain, will be reproduced, as are all such impressions, in the form of motion, and thus new groups of muscles, in this case those of the abdominal wall, are set in movement and aid in the expulsion of the undesirable guest.

Let us now turn to that most important and complex nerve centre, the brain, for on a conception of its mode of working will depend our comprehension of the manner in which external impressions of various kinds may be utilized as remedial agents of a highly important character.

In ground-plan the human brain may be said to be an aggregation of reflex centres, each receiving a specialized impression, each emitting ordinary motor force as a consequence thereof. Thus we have the centres for sight, for hearing, for smelling, for tasting, and for feeling, together with many others, mention of which, for the sake of simplicity, we must here omit. Now, it is perfectly certain that the impressions which are represented in the human brain by vision, by sounds, by odors, by sapid substances, and by contact with the skin, are, each and all, the result of the impact on certain parts of the body of matter in some one of its well-known forms, and that the final and wide difference in the impressions conveyed to the brain are due merely to differences in the forms and the movements of such matter, and, most of all, to the special apparatus, situated at the termination of each sense-nerve and on which the impression first falls. In short, there can be no doubt as to the absolute materiality of the impressions, of the existence of special apparatus for receiving and specializing them, and of their final exit from the brain as motor force capable of setting any part of the body in action.

Each nerve centre in the brain, though occupying a distinct area and being to a large extent a separate entity, has nevertheless important relations with all the others, for the impressions (called, in the brain, the sensations) it receives, ere their final exit as motion, blend with those from other centres, and thus produce what we know as an "association of ideas," and from this compounding of sen-

sations naturally arises an equivalent blending in the resulting motor currents, and hence such really complex movements as those of speech, music-playing, dancing, etc.

The above slight sketch will suffice to outline the way in which external and purely material impressions, acting on the impressionable sense organs, influence, and, indeed, command the brain, which, in its turn, holding in its hands the reins of the whole body, may in response set muscles or limbs in motion, or contract blood-vessels and decrease their local functional activity, or may employ one motor energy to counterbalance some other motor energy, and thus dilate blood-vessels and increase muscular functions, or check — in physiological language, "inhibit" — some movement that would otherwise have taken place.

Such then are some of the ordinary powers of the brain, whose existence is placed by innumerable direct experiments beyond the pale of doubt, and which are common alike to man and to the higher animals.

Thus we see that, in addition to the food channels, the arteries, we possess in the nerves of the special senses five great channels, by acting upon which we may influence at will each and every part of the bodily mechanism, provided only that the cells of the brain, and of the rest of the body, be fairly supplied with their proper store of energy by the food system, which is after all the first and most essential of all the systems, and literally and truly the source of life.

The reader will now, without difficulty, be able to understand how very easily, since the movements, the functions, and the very life of each and every organ, and portion of an organ, are under the direct control of that great nervous mechanism, the brain, we may, by applying suitable stimuli to the sense organs, increase, decrease, or

regulate the activity of any part of the body, and how simply it happens that the stern voice and the fixed glances of the mesmerist can throw into a cataleptic state the limbs of the patient, or hold the brain functions of the latter temporarily in his power. Given an impressionable set of nerve organs and a definite number and variety of impressions acting upon them, and the result is certain. The operator does not control the patient by his will, as for the greater mystification of the people he would fain have them believe, but by the purely material agency of words and glances;* for were the phenomena witnessed due to any psychic, any spiritual, agency, it is quite clear that the operator could dispense with all words of command and glances. Certain localities are also capable of a powerful influence over the bodies of some individuals, and the connection between cause and effect is precisely the same as in the case of mesmerist and subject. The solemn surroundings of such places are, to the eyes of the pilgrims, what were the glances of the mesmerist, and the wonderful stories of the benefits received are the exact analogues of his words of command, the direction thus given to the nerve currents resulting in the one case in rigidity of limbs, or the performance of comical actions, in the other in the return of power to weakened organs or in the healing of obstinate ulcerations. The thoughtless public do not know that it is simply and solely owing to the limited powers of the human eye that the real cause of the wonders observed, the impact of material impressions on the sense organs, and thence on the brain cells of the affected, is not actually visible, though its existence is

* Faith in the operator is usually considered, and is, indeed, a powerful aid towards success. It would seem to consist in a condition of the brain in which the inhibitory mechanism already referred to is in a state of quiescence.

as demonstrable and as tangible as is that of the vapor of absolute alcohol, of chloroform, or of ether, which, though invisible, can, at the will of the administrator, convert a quiet and harmless individual into a dangerous madman, or place speech and movement beyond the control of the subject.

It is then, I consider, clearly the duty of medicine to rescue from the hands of impostors these very powerful means of affecting for good or for ill—for they are equally potent for both—the body of man, and to formulate the nature and scope of their employment. In such a treatise as this I can do little more than mention a few of the methods in common use to restore health through the nervous mechanism.

Of these, *electricity* is the first in importance. Very rarely indeed is this potent agent applied to the nerves of vision, hearing, smell, or taste, or to the brain tissue itself; its use is restricted almost purely to the restoration of lost or defective motor and sensory nerve currents. Of the four forms in which it is employed, that known as *static* electricity, or Franklinism, is the most generally useful, the most easily applied, the safest, and the least known to the public. The electric force is, for this purpose, generated by friction, the Toepler-Holtz apparatus, with its large circular glass plates, which forms so prominent a feature in physical laboratories, being the instrument generally used in its production. It may be applied to the whole body, when it may be said to cause a general exaltation of functions, or mild stimulation, of use, backed up by surer means, in the treatment of hysteria, hystero-epilepsy, nervous exhaustion, and even in some varieties of real epilepsy; or its application may be localized, and its stimulating properties centred on one or more groups of muscles or other organs. In this way wry-neck, contract-

ures of limbs, spastic rigidity, and some forms of paralysis and of St. Vitus's dance, may be relieved or even permanently cured.

Next in utility as a means of treatment, comes the *dynamic* form of electricity. This is usually generated by the conversion of chemical energy, as the *static* variety is by that of friction energy, to electric energy. Dynamic electricity supplies us with the means of burning tissue (electro-cautery), or of more slowly disintegrating it (electrolysis), and is the usual agent employed in those portable batteries that produce the familiar "shocks," though sometimes the electric force is, in these cases, derived from a magnet, the name of *electro-magnetism* being then given to the results of this combination.

In the second part of this work, which will deal with the Art of Healing, I shall, where necessary, enter into detail as to the means of applying electric force in disease. In this place I will ask the reader to observe that, in electricity, we possess an agent which is capable, among other uses, of being employed to rouse any part of the nervous system, excepting the special nerves of vision, of hearing, of taste, and of smell. When it is desirable to act on these, other, and what are generally regarded as more mysterious, agents have to be found.*

In *mesmerism*, as I have already explained, we possess a potent method of influencing the whole body by acting directly on the brain. *Hypnotism*, so much in vogue as a therapeutic agent in Paris at the present day, is but mesmerism. It cannot be denied that, extraordinary as are

* While writing this my eyes fell on the following paragraph-heading in the *Lancet* of July 28, 1888, "Recovery of Vision by Lightning;" under which is given an account of the restoration of sight by the sudden stimulation of the retina of the eye by an electric flash, a most instructive and suggestive lesson.

often the benefits derived from the use of this agent, there exist great drawbacks to its frequent employment, for, while it has recalled many a sufferer from chronic nerve debility to health, it has also sent a large number across the border into the realms of insanity. There can be no doubt that extended study will enable us to better regulate the strength of impression, and that science may even provide us with a mechanical mesmerist; and an instrument producing the necessary kind and variety of impression on the sense organs is well within the limits of mechanical skill; but in the meantime this agent is liable to great misuse, all the more as it is in the power of every one readily to become more or less of a successful operator with it; and for this reason it should seldom, and only with certain safeguards, be had recourse to.

Faith-healing is an agent closely allied in its rationale with mesmerism. The glances of the mesmerist are replaced by the equally potent agents of impressive surroundings, the stacks of crutches, etc., to the influence of which the optic apparatus of the invalid is exposed, and the words of command by the narratives of those who have witnessed or themselves experienced the efficacy of the cure. As in the mesmeric performance, so in the processes of faith-healing, belief is insisted on as a *sine qua non*. Faith in God, which implies faith in the operator, or the locality, which are to be viewed as tools in his hand, is the first essential. I have had the advantage of meeting and conversing with many who have profited by faith-healing, and I have also read more than one well-authenticated work on the subject, and, while I am convinced of the truth of the results, which are usually, however, somewhat exaggerated, I have never seen any reason whatever for regarding them as divine or miraculous. In fact, the best and most permanent case I have ever wit-

nessed of a cure by impressions was that of a bedridden woman* who was restored suddenly and completely to healthy vigor by the intelligence that her husband had been arrested and imprisoned for stealing.

It is most instructive in this connection to note how well the ancients understood the power of sudden impressions made on the nervous system. Look at their methods of curing insanity. The unlucky patient was well beaten, or was hung head downward, or was nearly drowned, but, unless we are prepared to say that there was an organized conspiracy to lie, the desired result was often attained. Indeed, the ancients were closer observers of cause and effect than we are, and it is simply incredible that such cruelty would have received, as it did, official sanction unless there existed some really substantial evidence in its favor. About eight years ago there was reported by the medical officer of a northern asylum, in either the *Lancet* or the *British Medical Journal*, the case of a woman under his charge, who, after having for years suffered from insanity of an inveterate and apparently incurable type, had completely recovered her reason after being resuscitated from apparent death due to a most determined effort to strangle herself.

Of course, such methods of cure are not commendable, nor indeed are they probably as successful as the more modern and humane ones, but the study of them teaches us the useful lesson that a stimulation of the nervous system, even if painful, may be, and often is, beneficial in diseases that no drug can touch, and that no ordinary means can hope to effect.

Faith-healing then, like kindred agencies, may now and

* She had been six years in bed with functional paralysis, and her case had been regarded as hopeless by many doctors who had attended her.

again, in well-selected cases, be pressed into the service of the physician.

We now turn to almost the only means of the class we are considering of which modern medicine will take official cognizance—namely, *Massage.* Massage differs from both mesmerism and faith-healing, inasmuch as it not only provides the patient with healthy mental and physical pabulum, but also aids recovery by removing deleterious influences.*

The state of matters, in the case of invalids for whom massage is advisable, is often much as follows: The patient, usually an impressionable female, is surrounded by a sympathizing crowd of friends and attendants, almost the sole subject of conversation being the state of the real—more often supposed—disease under which the sufferer labors. From these, and often from the doctors, come many unwise questions, such as—Have you no pain here, no tenderness there? These questions in the debilitated mind of the patient take the form of suggestions, and new crops of symptoms are the result, and a complete physical and mental demoralization ensues.

In these cases, massage acts like a charm. The patient is *isolated*, the flow of baneful sympathy is arrested and replaced by the firm words of direction and of hope of the professional rubber. Recovery, as a subject of conversation, replaces valetudinarianism. In addition, the body is kneaded in all directions, and the accumulations of waste in the unused muscles and the current of blood in the capillaries are hurried forward, the kidneys excrete more freely, and appetite returns naturally. Nourishment is, after the first day or two, freely supplied, and in the course of a few weeks both the blood and the nervous

* I refer here to "general massage"—*i. e.*, massage of the whole body.

system have recovered their normal state, and the cure is complete.

Sometimes the patient is one of those despondent, introspective, hypochondriacal males, nearly always the subject of chronic neurotic dyspepsia.

In massage we then possess a rational and most excellent means to bring what we have called an extraordinary influence, or combination of influences, to bear beneficially on an advanced derangement of the nervous system; unfortunately, the system has been, and is, discredited by the unscrupulous use that is frequently made of it to unjustifiably deplete the pockets of the rich, the extraordinary nature of the remedy being used as a lever. It can be carried out thoroughly, at really very little expense, by any conscientious nurse to whom a few lessons in manipulation, and on the rationale of the process, have been given.

And now the first half of our allotted task—that which deals with the great underlying principles on which the existence of man rests—approaches completion. Let us once dispassionately view the human being as he really is, a bodily substance intricate and complex indeed in the arrangement of its several parts, but none the less purely physical in both structure and function, and keep ever steadily before our eyes the relationship which must exist between it and every other embodiment of force in its vicinity, and we shall discern clearly what health is, and on what its maintenance must depend—an equilibrium between the sum of the bodily and of the surrounding forces. Secure on this firm principle, it will be easy to trace the source of nearly every derangement, and, comprehending thus the real causation of bodily disorder, and possessing the key to the right interpretation of the phenomena, the symptoms manifested in the course of it, the sure road

to a simple and scientific method of treatment will become plain and easy.

Such is my idea of a rational system of medicine ; too conscious in its own strength to feel the pangs of jealousy or to dread the advent of rivalry ; too anxious for its own perfection to discountenance truth from any quarter; too wholesome to breed quackery; too secure in its hold on the human reason and too single-minded in its aims to doubt its own honor or its hold on the gratitude and affection of the human race. Such, when the time comes, will be the gospel of medicine, and, if I interpret aright the prevailing spirit of dissatisfaction regarding the present medical creeds, as well in the circles of the educated and thoughtful public as in those of the medical world, its advent cannot long be delayed. My attempt is, compared with such an effort, quite unambitious, more to write down in the spare moments of the day a sketch of what rational medicine should be, and thus possibly to act as the not altogether unworthy forerunner of a greater man.

PART II.

THE ART OF HEALING.

INTRODUCTION.

We now approach the practical application to the physical derangements of humanity of the principles of our science of medicine.

The human body is, as we have seen, not a mere aggregation of independent or semi-dependent organs, each pursuing selfishly its own course, but a perfect mechanism of nicely adjusted and interdependent portions, producing a real concert of functions emitting in health but one harmonious tune. If, then, for purposes of study, a grouping of such organs becomes necessary, it will be advisable to make our definition of each group as wide and inclusive as possible, and to base it on the sure ground of physiological knowledge. What, we ask, does the body of man? Firstly, it lives and moves, by virtue of the supply to its cells of material with which those cells can so act as to produce those phenomena; let then our first division comprise all the organs concerned in the *food system.* Secondly, it regulates its internal economy and its relations with the external world; let then our second group include the organs concerned in bodily government under the term *nervous system.* Thirdly, it possesses a system of fulcra and levers, the bones and muscles, which constitutes its *motor system.* This we must next study. Fourthly, and lastly, it reproduces itself, and therefore we shall have to say a few words on the *reproductive system.*

Grouping thus the bodily organs in the only rational manner in which any grouping of the parts of a perfect mechanism is permissible, according to their duties, and not in the ordinary method, geographically, according to the regions of the body which they chance to occupy, or, still more absurdly, according to the alphabetical order of the initial letters of their names, we shall be able to trace, without I hope any very great difficulty, many apparently disconnected phenomena of ill-health, having but the one origin, and requiring therefore but the one line of treatment.

No. 1.—The Food System.

CHAPTER VI.

SOURCES AND DESTINY OF HUMAN FOODS.

1. The Foods of Man, their Origin, their Digestion, and their Uses.
2. The Processes of Digestion.
3. The Organs of the Food System.

The Food System.

CHAPTER VI.

SOURCES AND DESTINY OF HUMAN FOODS.

In our first chapter we saw that the body of man, or, more correctly, the living cells of his body, requires two varieties of food, tissue-food, represented by *albumen*, by chemical union with which these cells live and multiply; and *fuel-food*, represented mainly by the fats, starches, and sugars, from the combustion of which, by the oxygen in the blood, the cells derive heat-energy to enable them to perform their various duties in life.

Inorganic salts also are required to assist the above chemical processes, and *water* to hold the food in solution.

All the above-named substances must be presented to the cells as crystalloids; the salts and the water are already of this nature, but the albumens and the fuel-foods are colloids, and therefore, ere they can be utilized as cell-foods, must be converted to crystalloids—must, in other words, undergo a process called *digestion*.

Let us now consider, in a little more general detail, the foods, the digestive process, and the parts assigned to the different organs of the food system in the body.

1. *The Foods.*

(1) *The albumens*, or tissue-foods, the material whose chemical union with the cells is the actual physical cause of the phenomena known collectively as growth and maintenance, must approach* in complexity of structure and in composition to the cells themselves, and a substance fulfilling such conditions can, as we might expect, only be found in organisms that have themselves lived. Now in the scale of life the animals come far before the plants, for every part of their structure, except the fat deposit, may be said to enjoy a share of life; in every part of them therefore, with the exception named, do we find the albuminous substance called protoplasm, fitted to act as a tissue-food. In the vegetable kingdom this is, however, not the case, the seeds only possessing a large share of that life essence, albumen, while the rest of the structure contains it but in small proportion.

The bodies of animals and the seeds of plants are thus our main sources of albumen or tissue-food.

(2) *The fuel-foods*, represented by the fats, starches, and sugars, whose destiny in man's body it is simply to undergo combustion, and thus to supply it with that motor power which, like a steam-engine, it derives from heat-energy,

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* The energy of a living cell is dependent on complexity of structure. When a new chemical compound, on which it can act, is presented to it, the resultant has a composition which is a *mean* of the complexity of the two. In order, therefore, that such chemical interchange should for long continue—in other words, that cell life should last—it is clear that the cell-food must approximate in composition somewhat closely to the cell itself, for, if not, that zero of simplicity of structure which bars further change because it is stable would too soon be reached, and death would prematurely ensue.

are, compared to the albumens, simple compounds, analogous in chemical structure to our ordinary fuels—wood, coal, oil, etc.—and are derived from those parts of the members of the animal and vegetable kingdom which have never enjoyed life. Therefore they are represented in the animal section only by the one substance, fat, all our other necessary supplies of starch, sugar, and vegetable fat being drawn from the trunks, branches, leaves, sap, and fruits of the vegetable world, as also from that portion of the seeds which is destined to act as pabulum to the albuminous germ.

(3) *The Salts and Water.*—Of these, as I am not writing a complete physiological treatise, and do not wish to burden the minds of my readers, I shall merely say that, as regards the former, common salt is the chief necessary member of the salt group, and as to the latter, that water enters largely into the composition of our solid foods, and that it, even in its simple condition as water, contains usually many of the necessary salts in varying amounts. With regard, furthermore, to the latter fluid, it must be added that the small micro-organisms usually found in it are not—if they be of the ordinary kind—evils, but distinct benefits, having very important effects as aids to the digestive process. From time immemorial has man consumed them, and, as in everything else, the body has conformed to its environment, nor can a single item in the latter be disturbed without such interference throwing the body out of balance. Modern science echoes every day more and more plainly those words in the Book of Genesis: "And God saw *all* the things that he had made, and they were *very good.*"

II. *The Digestive Process.*

This consists simply in *the conversion of insoluble* (*and*

therefore unassimilable) *colloid foods to the crystalloid form.*

The process is effected by means of ferments prepared in different organs of the body, and is exceedingly simple, each ferment having the power of adding one molecule of water to each molecule of the food on which it acts. This suffices to change a colloid form of food to a crystalloid one.

Now we saw in our first chapter that a crystalloid differs from a colloid, inasmuch as when dissolved in water it can penetrate all living cells, and can therefore flow through all animal membranes composed of such cells.

Such is the digestive process in all its completeness, exceedingly simple, and yet, as we shall see, equal to the many parts it has to play.

Let us study these various *rôles.*

Digestion of Albumen.—Albumen is a colloid on entering the body. In the mouth it undergoes no change ; in the stomach it is acted on by a ferment (pepsin), and in the upper part of the bowel by another prepared from the pancreas (trypsin), and as a result of these actions it becomes changed to a soluble crystalloid form of albumen (a peptone), which, by virtue of its new nature, glides through the animal membranes lining the stomach and bowel, and enters the fine blood-vessels (capillaries) which ramify there. From these vessels such soluble albumen would have the power of escape, as it had the power of entry, were it not that (probably) a sudden re-conversion of it into an insoluble colloid here takes place, the extra molecule of water, by virtue of which it could traverse the living membranes, being lost in the passage through them, or being claimed by the blood. Our albumen has now entered a channel of the great food-stream, the blood, and cannot escape therefrom ; on it goes in this current direct

to the liver. Here it meets walls of living cells, and, being a colloid, is arrested. This is an important stage in its career. Part of it is now oxidized to urea, uric acid, and bile acids, while the rest, the larger part, is again digested*—*i. e.*, has its molecules of water restored to it—and passes on into the great general blood-stream once more as soluble crystalloid albumen (serum of blood). But why does not this soluble albumen escape from the blood-vessels in which it now finds itself? The current of blood is too large and swift, and the coats of the blood-vessels are too many and too thick. So it travels to the right side of the heart, thence to the lungs, and back to the left side of the heart, whence it is pumped into the large arteries. Now it approaches its goal; the big arteries divide and subdivide, until, at last, our traveller finds itself circulating again in thin-walled capillaries, running this time among the living cells. Out of the blood-channel it passes and enters the cells. Now take place between cell and albumen those chemical changes and that liberation of energy which I have often referred to, and which constitute cell-life, cell-growth, and cell-reproduction. But this action involves the formation of waste, of bye-products. These *débris* pass out of the cells in the form of amides, amines, and amido-acids (which quickly are all converted to urea and uric acid), to enter interspaces which open into lymphatic ducts, these empty themselves into veins, and the urea and uric acid, together with the similar products formed by the liver, are conducted to the kidneys, and thence to the bladder, to be eventually voided with the urine.

Such then has modern science shown the digestion of albumen to be, a process so very simple as to be within

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* By the arterial blood which enters the liver by the hepatic artery.

the comprehension of all. Let us now review the changes which the fuel-foods undergo, and these will be found to be even less complicated.

Digestion of the Fuel-foods.—(A) *Starch.*—This is a colloid, but in the mouth it has added to each of its molecules one molecule of water, by means of a ferment (ptyalin) existing in the saliva. It is thus, in large part, changed to a crystalloid called grape-sugar, and as such it is swallowed. Whatever part of the starch consumed may have escaped digestion in the mouth, passes through the stomach, and in the upper part of the bowel comes in contact with a ferment (amylopsin), differing in name from, but identical in power with, that formed by the saliva, and which completes the necessary conversion to grape-sugar.* Thus the colloid starch of our food is represented in our stomach and intestine by crystalloid grape-sugar. This enters the capillaries as did the soluble albumen, is there in a similar way robbed of its extra particle of water, and becomes again a colloid (glycogen), and as such reaches the liver and is arrested.† This, as was seen to be the case also in albumen, is an important stage also in the journey of this fuel-food. Here the glycogen, or, as it is sometimes called, "animal starch," is stored. Now, the liver is the only organ of the body that has *two* distinct blood supplies, and the special need for this will now be apparent. The glycogen has travelled to the liver by the

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* The intestinal glands secrete a fluid that holds ferments that can complete the digestion of those albumens and fuel-foods which have run the gantlet, unscathed, of the first ferments, but their action is slight and too unimportant to need mention in a short sketch.

† It is a matter of dispute *where* glycogen is formed. Many physiologists hold that the liver itself prepares it from the grape-sugar, but more modern views incline to the view that this change is commenced before the liver is reached.

portal vein, which collects all the soluble food from the bowel, but the hepatic artery, also going to the liver, has the function of nourishing the cells of that structure, and the blood which it contains holds a ferment which can once more (by adding, of course, the necessary extra molecules of water) convert insoluble glycogen to soluble grape-sugar; but this latter ferment is present only in small quantities, and therefore the general blood system going from the liver to the heart is supplied, slowly and regularly only, with a small supply of grape-sugar from the great reserve store of glycogen in the liver, the latter organ being, as it were, a coal-scuttle from which the fire in the tissues is constantly and regularly supplied with the necessary amount of fuel to keep it at a fixed heat. What becomes of the grape-sugar that is thus sent on into the general circulation? It is oxidized—*i. e.*, gently burned—by the oxygen that is taken up by the blood in its passage through the lungs. The precise locality where combustion takes place is not accurately known; whether this grape-sugar is conveyed to the cells as was the albumen, and is actually there, or in that neighborhood, consumed, or whether the combustion is more general, is uncertain; but it is certain that the heat-energy evolved is stored by the living cells, and that the products of combustion, which are the same as those of a perfectly burned piece of coal or wood, carbonic acid and water, are cast out of the body, the former by the lungs, the latter by the kidneys, lungs, and skin.

(B) *Cane-sugar*, *milk-sugar*, dextrine, and gum are, like starch, converted to grape-sugar, and follow an identical course. Cane-sugar and milk-sugar are, however, not colloids.

(C) *Fat.* This colloid substance passes both the mouth and the stomach without undergoing any kind of diges-

tion. On reaching the upper portions of the bowel it comes into contact with the bile, which, dissolving the coats of the small fat globules, converts the fat into a milky, but still colloid, substance, as which it is taken up by the open mouths of the minute lacteal ducts with which the bowel is lined, and, journeying thence through the lymphatic glands of the abdomen, passes to certain ducts which empty themselves into the blood-current, where it undergoes storage in the tissues, and eventually, like grape-sugar, combustion, the products of which, as carbonic acid and water, are excreted.*

Some small portion of the fat would seem, however, to undergo a real digestion, similar to that of starch, by the action of certain pancreatic ferments called emulsion and steapsin, and in an altered form (as glycerine and fatty acids) to reach the liver, but this point is yet *sub judice.*

Finally, *the salts and water*, needing no digestion, being already crystalloids, travel through the bowel wall, the liver, and the body cells, without let or hindrance, the precise utility of the salts—and they are essentials to life—being still a subject of chemical investigation.

As fuel-foods, the starches and sugars in their readiness for combustion come, then, first. Then follow the fats which, unless the oxygen supply exceed the starch and sugar supply, tend to be rather deposited in the tissues than at once consumed. Finally, it must be added that all albuminous food that is absorbed undergoes a primary oxidation process, and thus in part is utilized as a fuel-

* Fat thus would seem to form an exception to our rule of digestion. It is, however, a great question whether it does so. Recent experiments seem to show that *all* the colloid fat absorbed is stored as fat in the body and forms thus a reserve fuel-food, which, according to bodily needs, is converted by the blood to a crystalloid form and burned.

food, but it can never answer for long as a substitute for the other fuel-foods, since the products of combustion of albumen include such nitrogenous substances as urea and uric acid, which, when present in constant excess, hamper, and finally break down, the excretory powers of the kidneys to which they go, and thus lead to disasters to be described in future pages.

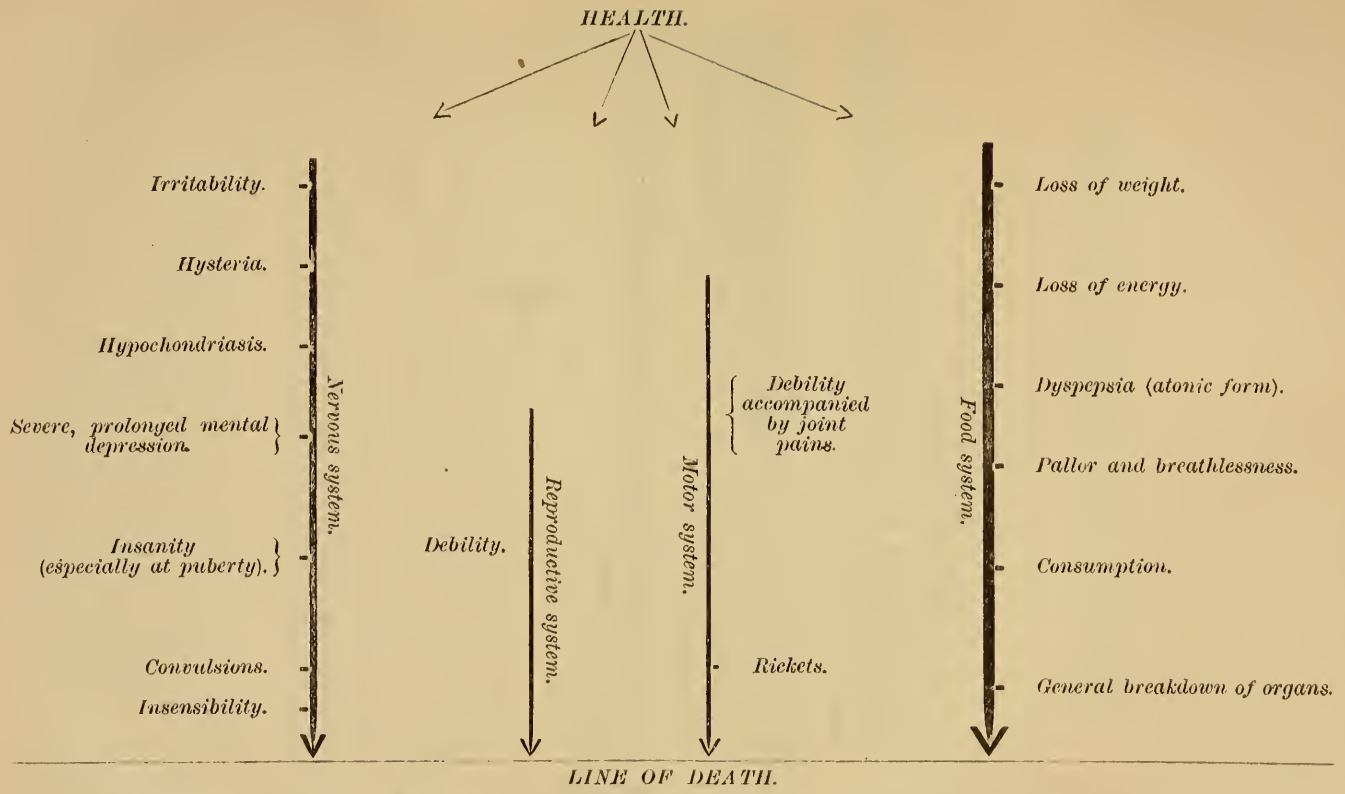
As to the origin of the digestive ferments. These are extracted—*i. e.*, prepared—from the blood by the salivary glands of the mouth, the peptic glands of the stomach, and the pancreatic and intestinal glands, while the emulsifying principle in the bile is derived from the same source. Hence we reach the first great truth about digestion—viz., that *a normal state of the blood is essential to good digestion*, while, later on, we shall see that, to the same end, there exist but two other, minor conditions, to wit, a normal state of the nervous system and an absence of degeneration in the digestive organs themselves, though it is open to question whether in the presence of the first condition, either of the latter can, to any great extent, exist.

Then there are certain further adjuncts to digestion, to which a few words must be devoted. Mastication is the first of these. That starch should be long retained in the mouth and thoroughly broken up there is intelligible enough, but in the case of albumen and fat, over which the saliva has *no* power, the need for mastication is evidently not so great, and carnivorous animals, as we know, naturally *bolt* their food. Secondly, the muscular power of the stomach and bowels, which has the effect of presenting all the different parts of the aliment they contain to the action of the digestive fluids, is an important aid to digestion, and must not be lost sight of. Lastly, the intestine undertakes the removal from the body of all food or other material consumed in excess of the digestive power.

We now approach the last of the three subjects which this chapter is designed to elucidate, namely :

III. *The Organs of the Food System.*

These comprise the mouth and its salivary glands ; the stomach and its peptic glands ; the intestine with its pancreatic and other numerous small glands ; the portal vein and its tributaries, which, having the special function of conveying food stuffs from the bowel and the stomach to the liver, deserves to be considered apart from the general blood-stream ; the liver ; the blood-channels and heart ; the lungs, whose function is to take in oxygen for union with the foods, and to emit the carbonic acid and water, the products of that combination ; the lymphatic ducts and glands ; the skin ; the kidneys and bladder. To these fall to be added certain organs of vague function, of which the most important is the spleen. We are now in a position to discuss intelligibly the diseases due—(1) to defects in the food supply ; (2) those due to faults in digestion as a process ; and (3) those due to disease of the organs concerned in the food supply.



Explanation referring to above diagram.—The symptoms dependent on deficiency of food will select, for their chief manifestation, the patient's weakest system—*i. e.*, the line of the least resistance.

Treatment of all grades of deficiency.

1. Supply digestible, nourishing, simple food in proportion to sufferer's needs and powers, exercising, at first, in advanced cases, the greatest caution.
2. Supply oxygen, by means of fresh air, to consume such food, and to thus render it available for the bodily requirements.
3. Supply exercise sufficient to the removal of all food waste from the muscles.
4. See that clothing, occupation, and habits of life be suited to the bodily needs.

CHAPTER VII.

DISEASES DUE TO FOOD.

(A) TO DEFICIENCY OF FOOD.

If the human body be deprived of all food for many days, or if the food obtainable be of an exceedingly dry nature and necessary water be withheld—which amounts to the same thing, since food is valueless to man in the absence of water to dissolve it—**starvation** sets in, death resulting when the body has lost about 40 per cent. of its ordinary health weight.

The actual sequence of matters in acute starvation of that kind is as follows: The reserve of serum albumen in the blood and that of starch in the liver and of fat in the tissues are first used up, and then, to keep the flame of life still burning, the living cells themselves are drawn on, until a point is reached which is incompatible with further existence.

The more striking *symptoms of acute starvation* are *craving for food*, a *gnawing pain in the region of the stomach*, both of which symptoms subside in two or three days, *insatiable and continuous thirst*, *sleeplessness*, *pallor*, *loss of weight*, a *tendency to decomposition of the tissues*,

indicated by the *fetid smell of the breath and sweat*, great *prostration* ending in *torpor*, *delirium*, and *convulsions*, which latter symptoms are indicative of the starvation of the nerve-cells of the brain.

Death from deprivation of both food and water occurs in about six days, but the supply of even minute quantities of food, or even of water only, may prolong life for several weeks.

The signs of starvation may be commonly witnessed in prolonged fevers: *e. g.*, in typhoid fever, many of the advanced symptoms of which are more due to deprivation of food—a deprivation which the conditions of life in fevers render us often impotent to rectify—than to other causes. One rare fever, relapsing or famine fever, is due to little else than starvation, and prevails only in times of great destitution, though the presence of a minute organism (*Spirochæte Obermeierii*) in the blood of the sufferers is accountable for some of the symptoms witnessed, and for the epidemicity of this disorder.

A few words on treatment. We know that in all cases of starvation water has a remarkable power of prolonging life. It, like the necessary salts, some of which it also contains, is a crystalloid, and therefore can pass without challenge the tissues, which, in fever, bar the way to the, in that condition of matters, indigestible and insoluble colloids. Let, then, the fever patient have the water for which his body urgently calls, to his heart's content, and, in the name of common-sense, let him have *ordinary drinking-water*, with its useful salts and its ordinary micro-organisms. I have scores of times seen the modern nurse, in her ignorance of nature and of real science, doing her best to substitute a stone for bread, by sedulously administering to the sufferer some bottled *pure* water, or water deprived by boiling or by distillation of much of

its nutriment. Warmth again is as useful as water, for if we can, by lessening loss by radiation, economize the bodily heat, it is evident that we shall succeed in reducing considerably the results which flow from want of fuel-foods, for death by starvation is partly death by *cold*. Rest will further the same desirable end, since fuel-foods supply the body with motor power as well as heat.

The treatment of starvation — whether witnessed in fevers or in other cases—consists then in warmth, rest, and the cautious administration of such foods as can be assimilated. In fevers, water and bland fluids, whey, and fruit, by reason of the crystalloid salts which they contain, may be given in the worse cases. Colloid foods, even if artificially digested, must be given only in the smallest amounts, for digestion is not a mere passage through the wall of the stomach and intestine, as most manufacturing chemists seem to think, but a multiple function continued long after the foods have passed successfully that first stage. The administration of albumens, starches, sugars (which become colloids in the liver), and fats must be graduated nicely to the severity of the fever, while in ordinary cases of simple starvation they may be given cautiously when the first stages of debility have been overcome.

Slow starvation is one of the commonest, as it is often also one of the least suspected, causes of ill-health. It is generally the result of a deficient supply of food only, but may be also due to, and is always aggravated by, debility of the stomach and bowels, impurity of that great digestive fluid, the blood, want of a proper supply of oxygen, or want of the important waste remover, exercise. It is of many grades of severity; sometimes so slight as to induce only *chronic debility*, ofttimes also is it—especially at certain stages of bodily growth, when a full supply of food becomes more than ever necessary—the exciting cause of

some rapid disease, and especially of **Consumption,** which terminates life without exciting any suspicion as to the real cause underlying its appearance.

In baby-life death by **slow starvation** is exceedingly common, even the healthiest and most robust children succumbing in numbers to its attacks, and this because the *real* needs of a baby in the way of food are often misunderstood, the symptoms of slow starvation being held to mean some internal derangement—rare and almost impossible as can be a serious derangement in the properly fed infant—calling for treatment, rather than actual want.

The signs of baby-starvation are as follows: Firstly, there is *fretfulness;* secondly, there is *wasting;* thirdly, there appear *vomiting* and, usually, *purging,* which gradually increase in severity, for, as the stomach weakens, the improper food administered (and usually it is a food indigestible in kind rather than deficient in amount which underlies the derangement) becomes more and more unsuited to the digestive capacity, and is rejected with greater and greater frequency. As a symptom that the process of starvation has affected seriously the nerve mechanism, *convulsions* appear towards the last and terminate the scene.

And it must be confessed that the fatal termination is generally hastened by various well-meant but ignorant procedures. The fretfulness is thought to be due to temper, and a narcotic is given; the wasting is regarded as a sign of some grave disorder (usually of consumption of the bowels), and as such is duly treated; the vomiting and diarrhœa are thought to be symptoms of the same fancied disease or due to teething, while the convulsions are interpreted to mean anything or everything except what they really indicate, starvation of the nervous system.

The treatment is simple, but its application requires tact

and some little knowledge. Whatever the stage of the complaint, the food given must be of a kind which the stomach can digest, and must be nicely suited to the present condition of weakness. If the case be a severe one, barley water, rice water, or whey, sweetened to increase their nourishing power, should form for a day or two the *sole* nourishment. Poor as are such substances in nutritious ingredients, they are probably each richer than the very tiny quantities of the other foods which the child's stomach has been able to retain. Then, as diarrhœa and vomiting subside, a gradual advance is made; a tablespoonful of cows', or a salt-spoonful of condensed, milk is added to each bottle, or a very weak solution of Benger's farinaceous food may be given twice a day. Increasing the food strength in accordance with the child's increasing digestive power, it is usually easy to restore the sufferer to complete health without the least aid from drugs.

I have spoken so far of healthy babies, but when the unfortunate infant is born with the heritage of scrofula or of syphilis, it can easily be understood how the special weaknesses and deformities of such maladies will complicate the troubles and increase the chances of a fatal termination.

In later childhood, from two to ten years of age, a discrepancy between demand and supply in the food will manifest itself in general weakness, and, in bad cases, in bending of those bones upon which most weight is thrown, *i. e.*, in **Rickets**; sometimes even in **Consumption**, which, commencing in the abdomen or the brain, will secondarily affect the lungs and the whole body.

In adolescence, from ten to twenty-one years or so, a period fraught with special dangers has to be faced. Rapidity of growth, considerable mental and physical effort, and last, and most important of all, the awakening

of a new and important system, the reproductive one, make special demands on the body for a large supply of food—*i. e.*, of energy—to meet the emergencies of the period. Not only, however, is, at this time, suitable and nutritious food demanded, but the necessary adjunct to food, oxygen, must be secured to enable the body to draw from the food its hidden forces, and this is obtainable only by abundant exercise in pure air.

When either or both of these requisites, food and oxygen, fall at this time of life short of the bodily demand, a train of special and peculiar symptoms is witnessed. In young women, **Hysteria,** *languor, deficiency or absence of periodic discharge,* a *pallor* of the skin approaching the hue of tallow, great *breathlessness,* and severe *indigestion* are the usual signs of physical distress, and if exercise and fresh air have been deficient, while food has been supplied in plenty, a considerable deposit of fat over the body will also, and very naturally, be witnessed; but, on the other hand, should food and fresh air both have been deficient, and the physical exertion excessive, *loss of weight* will accompany the languor, breathlessness, and other symptoms, and **Consumption** of the lungs may make its appearance.

In young men, while consumption at this period is as common as in young women, and often due to the same cause, a deficient supply of food does not lead to so much pallor—a pasty rather than a tallowy hue being observable—nor to breathlessness; *dyspepsia* is, however, as common a symptom as in females, while **Hypochondriasis** often replaces the hysteria.

There is no man to whom the grave seems so near and so terrible as to the male adolescent dyspeptic. He runs in a state of great trepidation through the gamut of fancied disease, selecting the gravest, and, at his age, the least likely. His conscience is morbidly acute, and woe

betide him if he fall, in this state, a prey to the quack. The crops of acne on the face and back will then be represented to him as due to syphilis; the palpitation, to heart disease; the vertigo, to coming insanity; the dyspepsia, to liver disease or to phthisis.

A real **insanity of puberty** is, however, a recognized and not an uncommon form of mental disorder, attendant often directly on lack of food and of oxygen. It is, though an alarming, not a very serious complaint, and is the direct result of anæmia of (*i. e.*, poverty of blood in) the brain-cells. In every specimen of it that I have witnessed, a little knowledge and ordinary care might have prevented the attack, which in every case has been eventually recovered from. It may be added, lest my words alarm the hypochondriac, that in these cases of mental disorder there is neither before the attack, nor at the time of it, any anxiety of mind on the part of the patient, the mental condition being one either of torpor or of exhilaration, and thus contrasting strongly with the gloomy, foreboding disposition of hypochondriasis.

In middle life, privation, especially if but slight, has no symptoms sufficiently specialized to indicate clearly its existence. It may, in common with many other causes, be a factor in the production of *consumption*, or again in that of *insanity*, or even of *gout*, but, certainly among neurotic females, and even occasionally among males, of the upper class, a train of remarkable symptoms, marked by *loss of flesh*, *morbid irritability*, *despondency*, and great *general weakness*, all the result of starvation of the nervous system, are commonly witnessed, and invariably disappear, when, under a course of massage, food in good quantities is administered and its digestion rendered possible by that mechanical exercise of the muscles which massage insures.

In old age the evils of privation are seen less frequently of all, and at their minimum. No doubt a lack of fuel-foods at this time leads often to suffering from cold, especially when the bodily covering is so defective in nature and amount that heat is rapidly lost by radiation, but the demands of the body for tissue-food are relatively so small that slow starvation as a cause of death is, at this period, certainly uncommon. Danger at this time of life generally comes from an opposite direction—from an excess of food.

What remedy, then, shall we adopt for a deficiency in necessary food in the last four periods of life mentioned? The administration of food? No; that alone is quite insufficient. Food *and the means of digesting it* are both essential, and the latter are to be sought in a good oxygen supply—*i. e.*, in fresh air—and in a due renewal of waste by means of exercise.

Drugs are worse than useless. No doubt, in the anæmia of young women at puberty, iron will often improve matters, but if good air and good food can be secured, even the use of that drug may beneficially be omitted.

But what about diet-tables—how many ounces of albumen, of fat, of starch, of water, and how many drachms of salt per diem, should be taken at these different periods of life? There is not any answer to such a question. When the day comes that all individuals of the same age are of the same size and weight, and have been brought up in the same habits, then it will be of use to humanity to have such a table of dietaries, to learn it by heart, and to pass laws making it penal to disobey it; but at the present day, *weight*, that is, the weight of the living portions of man—which may roughly be said to be that of a man, minus his fat, for fat does not eat or live—is, as we all know, at similar periods of life subject to wide varia-

tions, and to say that the six trillions of living cells in A demand the same nourishment as the ten trillions in B is as absurd as to assert that the necessary food for an army of 600,000 is the same as that for one of 1,000,000 men. Then we have to consider the oft-neglected question of habit. What, in the way of food, are the habits of your individual—*i. e.*, of his cells, of the units of your army? And everything that feeds, be it remembered, has certain food limits within which habit can operate, providing it does so gradually, without destruction of health. A full-feeding man will lose weight and strength rapidly on a dietary upon which a laborer of similar weight and age can retain both; our prison records are fruitful in examples of men who have lost their lives because their bodies would not bow to the hard-and-fast limits of food upon which the half-starved refuse of our towns had maintained health, and which Red-tape had, in defiance of Nature, decreed as the amount on which *all* men can subsist.

I repeat then, as the sole rough guide to a physiological dietary that I can conceive, the following rules, given already, with their defence, in Chapter IV., and I must add that even the application of these should be checked by that other great factor in every calculation that applies to man—habit.

I. Per unit weight of living tissue, the demand for albumen (tissue-food) falls steadily, in the condition of health, from birth to death.*

II. As far as can be judged from the study of the most reliable diet-tables, the demand for tissue-food per pound weight† of body is, at birth, about 2 grammes or 30

* It is instructive here to remember that the heart-beats of the newly born infant are also double in number, per minute, those of old age.

† Here, for the sake of simplicity, I speak of individuals of aver-

grains, and in extreme old age, about half that amount; the intermediate periods of life exhibiting in this respect, from birth to death, a steady decline of from $\frac{1}{5}$ to $\frac{1}{4}$ of a grain, per pound, per year.

III. In the case of the fuel-foods, the diet-tables also indicate an equally steady fall in the same direction, but the computation of the relative amounts is more difficult, since the value of fat as an article of diet, as compared with that of starch, is as 17 to 10.*

Taking, however, as in the case of tissue-food, the weight of a young infant as 18 lbs., and its normal daily fuel supply at 2 oz. of fat and $4\frac{1}{2}$ oz. of starch, that is, in terms of starch only, about $7\frac{1}{2}$ oz. or 240 grammes per day (for *both* fat and starch are not necessary; each of them can, provided allowance be made for the difference in food value, usually replace the other), we find the demand, roughly speaking, to be $3\frac{1}{4}$ drachms, avoirdupois, of starch per day, per pound. Taking also the weight of an old man at 154 lbs., and his physiological daily needs at 22 oz. of starch and 4 of fat, which, rendered in terms of starch food only, means approximately 29 oz. or 928 grammes, and let this be divided by 154, the number of pounds, and we have per pound, per day, a demand in old age of $1\frac{1}{2}$ drachm avoirdupois.†

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age fatness and include their adipose tissue. Nevertheless, inasmuch as fat is not, and never has been, of the nature of living, food-demanding cell-tissue, all *excesses* of fat above the average must be deducted even in this calculation. In women over thirty, and sometimes, but more rarely, in men, this extra fat may constitute one sixth or more of the total bodily weight.

* Some authorities put the proportions at 25 to 10.

† The table from which I have made my calculation is one founded on the *mean* of the several tables of the eminent authorities Drs. Parkes, Davy, Playfair, Von Pettenkofer, and Von Voit, and quoted on page 259 in my book "The Demon of Dyspepsia." I

If starch be rendered in terms of fat, the result will, of course, for infancy and old age, remain, relatively, the same.

Old age requires, then, about half the amount of both albumen and of fuel-food, per unit of weight, as compared with the commencement of life.

IV. The daily demand for fuel-food varies, however, from causes which have little or no effect upon the question of tissue-foods. The following conditions render necessary, within certain limits fixed by the powers of digestion, an increased supply.

(*a*) Great exertion. For fuel-food supplies the motor power of the body.

(*b*) A cold state of the atmosphere, for fuel-food being the source of bodily heat, it is clear that the greater the loss of the latter by radiation, the larger must be the supply of fuel-food to keep up the necessary temperature of the tissues.

(*c*) A moist state of the air which favors the loss of heat by the body.

(*d*) Deficient or unsuitable clothing. Flannel, silken, and woollen materials in general are bad conductors of heat, and have, as we all know by experience, a very powerful influence in preventing an undue loss of caloric, and therefore act as economizers of fuel-food, while cotton, linen, and flaxen clothing materials have an opposite character and effect.

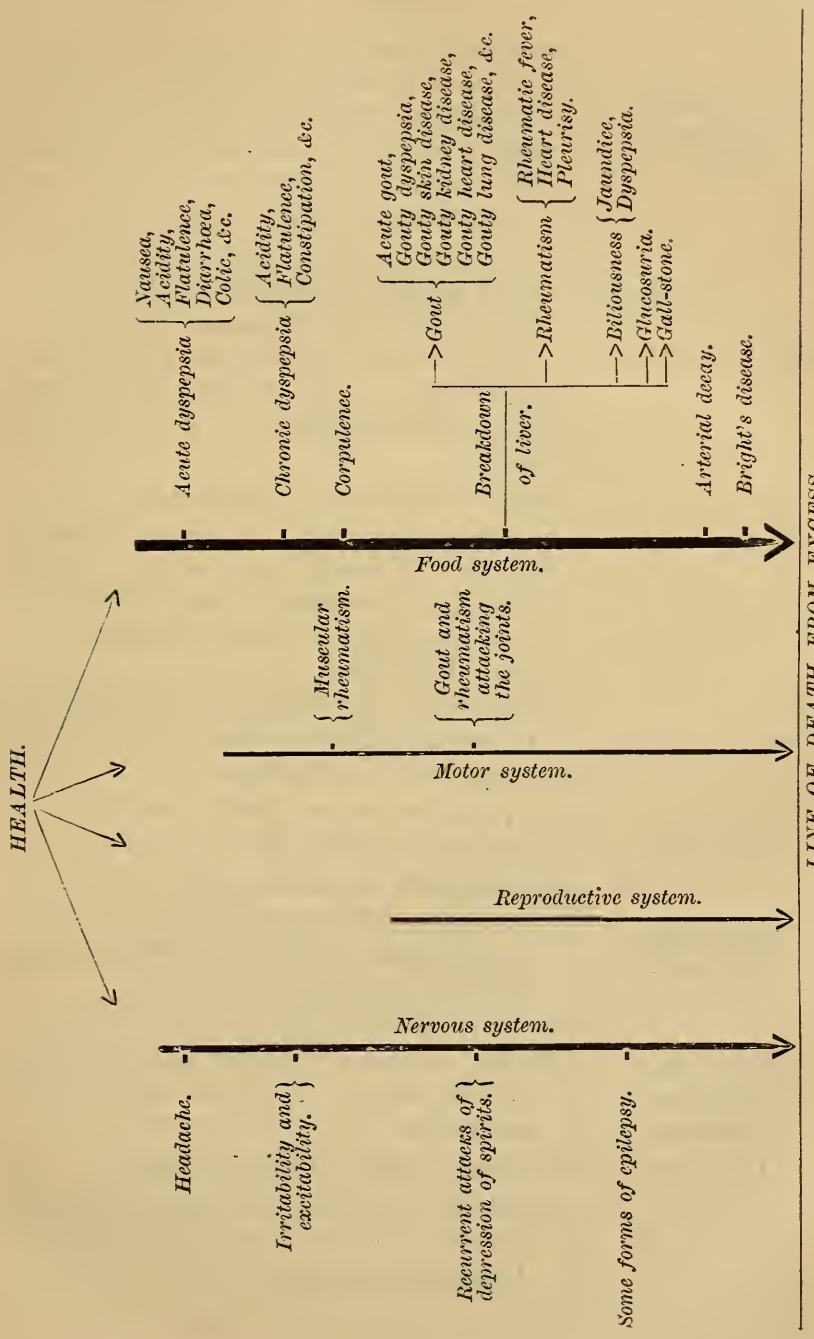
We possess no sufficient data upon which may be based rules applicable to the daily physiological needs in the salt and water supply of the body, and though death invariably ensues, within the course of a few days, when either or

have not aimed at strict mathematical accuracy, as the public do not take kindly to decimals; nevertheless the calculation is sufficiently close to prove the rule laid down.

both of these ingredients is withheld, yet there exists no single classified disease, not even excepting scurvy, which, as far as we know, can be said truthfully to depend *solely* on an habitual lack of either of these essentials. The bodily instinct in the case of the consumption of water and common salt (as in that of other foods) is so strong, and the means of gratifying it so ready to the hand, that it is perhaps difficult to conceive any common disease that can have as sole cause and origin a want of either salt or water; but in regard to other salts—also essentials in food, though only in minute quantities—such as the chlorides of potassium, magnesium, and ammonium, and the various alkaline phosphates, carbonates, and sulphates, found more commonly in the vegetable than in the animal world, and largely lost in the act of cooking, it is evident that a lack of them is, while still not the sole, at least the main, factor in many well-understood derangements of the bodily mechanism, to which I shall presently draw attention.

CHAPTER VIII.

DISEASES DUE TO EXCESS OF FOOD.



Treatment.

Acute Dyspepsia (Acute Gastric Catarrh).	Discontinue nearly all feeding for a day or two, then gradually and cautiously return to a normal dietary. Let the patient rest. Empty the stomach and bowels by a purgative; then soothe them by poulticing and by administering, if necessary, bismuth.
Chronic Dyspepsia.	Cut the food down in amount and quality so as to suit the bodily needs. Avoid, as a rule, all alcoholic stimulant. Enjoin *exercise* in the open air. Remove all conditions unfavorable to the general health of the body. Give no drugs, or only an occasional purge.
Gout.	Order the minimum of necessary food, but allow an abundance of water. Exercise freely. Frequent hot bathing. Warm clothing. Avoidance of worry and all depressing agents. Bowels to be kept regular. Dry climate. *Acute* gout to be treated by rest, application of warmth to inflamed parts, very restricted dietary and smart purgation.
Biliousness.	Simplify the dietary, enjoin abundant exercise, and keep the bowels regular.
Rheumatism (Chronic).	A minimum of necessary food. Abundant (not excessive) exercise. Warm clothing. A *dry* climate. Frequent bathing, followed by prolonged friction of muscles. *Acute* rheumatism, treated like the fevers.
Glucosuria (Functional Diabetes).	Lessen amount of starchy and saccharine articles of food. Exercise. Improve general health.
Gall-stone.	Simple diet. Rest. Surgical measures.
Corpulence.	Exercise. Take little fluid with food. Avoid fattening articles. Reduce diet scale to minimum necessary.

CHAPTER VIII.

DISEASES DUE TO FOOD.

(B) TO EXCESS OF FOOD.

In our last chapter we briefly discussed the consequences that must, and do actually, ensue when the body of man is deprived of food, the sole source from whence he can draw life and movement. We also observed that a due supply of food could not alone rectify the symptoms of deprivation, but that an efficient intake of oxygen to extract, by consuming, the energies from this food must also be provided for; and that, finally, a removal of the waste material clogging the blood and lymph channels, and thus obstructing the due passage to the cells of the food consumed, is the third and last essential in the cure of slow or rapid starvation of these cells, and the starvation of his cells is the starvation of the man.

Food, normal in quality and amount, pure air and muscular exercise, were thus, we rightly concluded, the three concurrent means to be employed for the cure of a deficiency in the food supply.

But many and grave as are the bodily derangements that ensue in cases where the consumption of food falls be-

low the necessary level, they, by comparison with those that are due to the opposite condition, that of habitual excess, become almost insignificant. And excess, like deprivation, may be of two very distinct kinds. We may have, on the one hand, a group of striking symptoms, the importance of which we are forced to recognize, and the discomfort of which compels the glutton to be cautious, to which we shall give the name of **Acute Dyspepsia,** all the rapid and evident sequence of a sudden or gross act of gluttony, an intake of food disproportioned to the powers of the digestive organs ; or, on the other hand, we may witness, as the result of habitual but slight excess, a series of comparatively trivial, but gradually increasing, discomforts, some of which are felt in the abdominal regions, while others have apparently no connection whatever with a failure of the digestive powers, and may only be tracked to their origin by steadily keeping in mind the great physiological truth that digestion is the *one great process* of life, and that it is not confined to the mouth, stomach, and intestines, but continues in the onward passage of the food, after it has left those organs, and until it reaches its final destination in the body.*

Let us first, then, study the effects of sudden gross excess of food, which induces that train of painful symptoms spoken of collectively as **Acute Dyspepsia,** and in medical books as **Acute Gastric Catarrh,** both of which terms are imperfect, the first implying too much, the second too little. We shall here adopt the former of these designations.

* Digestion is a series of simple changes by which the three varieties of food, in chemical language called the albumens (tissue-foods), the hydro-carbons (fats), and the carbo-hydrates (sugars and starches), are from the time of their entering the mouth till they leave the body by the kidneys, skin, lungs, etc., alternately changed from colloids to crystalloids, and *vice versa ;* salt and water undergoing no change, but, as solvents of the others, remaining always crystalloid.

The causes of acute indigestion are found in a consumption of food, in quantity or in quality, in excess of the digestive powers of an individual.

The amount and kind of food necessary to set up these symptoms will vary, as will the severity of the symptoms themselves, with the age and the previous state of health, the suddenness of the excess, and with other conditions. I will give a sketch of a typical case, and will suppose that the food which has set it up is an admixture of albumen, fat, starch, and sugar. The following is the order of the phenomena.

In the mouth, there is at first no derangement, but after the stomach has become disordered, it, through its intricate nerve connection with the latter organ, participates in the disorder, *the tongue becoming furred, the saliva sticky*, lacking in digestive power and sometimes even *acid in reaction*, and *the taste vitiated.*

In the stomach, over-distension leads to partial loss of power; the food is therefore neither properly rolled over, so that each part may be presented to the digestive fluid, nor is it duly moved on towards the outlet into the bowel. As a result, *fermentation* sets in, and *irritating acids and gases are given off* by it. The patient complains therefore of *pain*, *weight*, *distension*, *acidity*, and *flatulence* in that region.

In the bowel. Slowly this acid, fermenting mass reaches the bowel, but neither the digestive fluids of the pancreas nor those of the bile can exert their power over it, for they are only effective in an alkaline medium. On therefore along the many feet of bowel rolls the food, its acid state irritating the lining membranes and setting up griping pain or *colic*, its gas distending the coils of bowel and thus producing further discomfort. Eventually it is expelled the body, acid, full of gas, and mixed with

water drawn by the irritation from the walls of the intestine.

In the other parts of the body. Such a state of matters as I have sketched must affect in some measure every bodily organ, for, independently of the general reaction set up by the gastric and intestinal disturbance, other effects of a disturbing nature are witnessed in the most distant parts of the body as a result of some slight absorption into the blood of the acids and other crystalloid products of decomposition. The patient will, as a result of the latter, experience *headache*, *vertigo*, *rheumatic pains*, *depression of spirits*, and possibly a little jaundice and other discomforts.

But there is one variety of acute indigestion in which, though the symptoms are identical to, the causation is a little different from, the one just drawn.

In any and every form of blood derangement, whether the contamination be due to some improper nourishment or be the secondary consequence of some general and severe disorder, the stomach may be selected as the seat of one of the *crises* by which the course of those disorders is marked, as least for as long as the body of the sufferer retains a fair amount of vigor. Thus in gout, rheumatism, lead poisoning, and chronic biliousness, all at once, without warning or apparent cause, acute indigestion may come on and render the patient miserable for days, while in progressive pernicious anæmia, in locomotor ataxia, and in other nervous diseases, the same phenomenon is so common as to form a distinctive feature in making a diagnosis. In the early stages of most fevers, before yet the cells have been so poisoned as to lose their power of rebellion, a similar state of matters is also, as most of us know, to be witnessed.

In every case acute indigestion is a markedly beneficial

process, ridding the body of poison, or of excess, as the case may be.

Treatment of acute indigestion. The line of treatment is a close copy of Nature's own processes.

The first of Nature's symptoms, and the one to avoid complicating the picture, to which I have not as yet referred, is sickness. The gastric disturbance naturally produces this—*favor it* by taking, in the early stages, and while the stomach is still loaded, mild emetics. Hot water, or hot water and salt, will generally suffice. If acidity still persist, *favor it* by drinking every hour or two a tablespoonful of lemon-juice, or twenty drops of diluted sulphuric acid, in a wineglassful of water. If some of the fermenting food has reached the bowel, *favor its expulsion* from the body by a quick and mild aperient—castor oil is the best. There is loss of appetite, take no food; there is thirst, take plenty of water, or other bland fluid, such as barley or rice water, that cannot aid fermentation. There is disinclination for work, noise, or light—rest in a quiet, darkened room.

If, after these measures have been taken, irritability of the stomach, nausea, etc., still persist, take what Dr. Lauder Brunton ("Pharmacology," 1885, p. 318) calls a mild stomachic irritant—trisnitrate of bismuth. This drug is perfectly innocuous, its action being almost purely a mechanical one. As much as will lie on a shilling may be taken every one, two, or three hours, according to the persistence of symptoms, in a wineglass of freshly drawn soda water or in thick barley water.

Should some gastric and abdominal pain nevertheless persist, compel the skin to share in the burden of the disorder by congesting it mildly, which can be done by applying hot poultices, in rapid succession, to the abdomen, or a mustard-plaster over the pit of the stomach.

As a guide to the dietary of the patient the desires of the sufferer will be the best guide, and he will generally, and very wisely, decline all food for the first twenty-four hours. The return to a full dietary must be very gradual and extended over some days.

Such is acute dyspepsia, and such its satisfactory, its rational treatment. Let us now turn to the consequences of habitual, but perhaps only comparatively slight, excess —not generally recognized by the patient as excess at all—and trace the many consequences thereof.

Once more we will, in spirit, follow the food through the digestive organs and channels, and trace successively in the mouth, stomach, and bowels the series of derangements, varying somewhat in every individual, and collectively known as **Chronic Dyspepsia.**

In the mouth we very plainly see in loss, decay, and discoloration of teeth, or in much dental patchwork, evidences of the mischief wrought. The tongue is abnormal in appearance: it may be bright red, a condition due to a transient gastric irritability reflected by the agency of the nerve mechanism on the tongue, but more commonly it is *slightly furred, soft, and indented at the edges* by the teeth.

In the stomach there will be present a marked *loss of muscular tone*, a pale grayish appearance of the organ contrasting markedly with the rose-pink hue of health, and much mucus. The patient will inform you that he can still digest plain and restricted meals, such as are composed of meat, bread, green vegetables, and fruit only, or of coffee and bread with butter, or bread and cheese taken alone, or a milk pudding, but that he experiences *discomfort after mixed and large meals*, and that sweet wines (great favorers of gastric fermentation) act as poisons with him.

In the bowels the same *loss of tone* is evident, and as a result we hear complaints of *constipation*, of obstinate collections of wind in dilated coils of intestines, and of occasional attacks of *diarrhœa* from food that has lain too long in the intestine and has become intensely acid.

In the liver we witness such important signs of breakdown that we shall consider them separately.*

But let us indicate the general line of treatment of chronic indigestion before we discuss the results, as seen in the liver, of excess.

First of all, limit the food-supply to the digestive powers. Order small, simple meals of plain, well-cooked, and digestible foods, selecting, however, wisely those that contain a large quantity of unassimilable material—such are to be found in brown bread, the various porridges, fruits, vegetables, etc.—all of which will assist a regular evacuation of the abdominal contents. Discountenance large mixed meals, and also, in most cases, the drinking of alcoholic stimulants. Convince the patient by reference to even the most liberal of diet-tables that he has been consuming for a long time much more food than his body actually requires.

In obstinate cases, especially in those where a suspicion of gout is found, it is well to order a *gradual* approach to a strictly vegetarian dietary, allowing meat but once a day, and in time discontinuing even this.

Secondly, order reasonable amount of exercise in pure air, so that on the one hand the muscles may rid themselves of waste, and on the other the lungs may draw in an abundance of oxygen to consume the foods.

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* Chronic indigestion is not always due alone to a mere excess of food over the digestive powers, for these latter may be enfeebled by bad air, by overwork, by worry, by inherited taint, etc., and thus be factors in its causation.

Thirdly, seek to remove conditions unfavorable to the general health—worry, bad air, close sleeping-apartments, presence in the blood of any poison.

Lastly, give, if necessary, from time to time, a simple purgative to aid matters. A combination of bismuth, bicarbonate of soda, and rhubarb answers well. (Form. 1, Appendix.)

Disturbances of the Liver, the result of an excess in the food supply over the bodily needs.—The liver has four great functions :

1. It converts a portion of the albumen it receives to urea, etc.
2. It converts a portion of the albumen it receives to bile acids.
3. It converts a portion of the albumen it receives to serum albumen.
4. It stores, as glycogen, the carbo-hydrate fuel-foods.
5. It acts as an excretory organ.

Now, overwork of the liver means, sooner or later, a breakdown of its functions, the advent of failure being hastened by the influences of heredity or of any other cause, such as mental anxiety, which exercises a debilitating influence on the liver in common with the whole body, or by the presence of poisons, especially of lead, in the blood-current, and these facts require to be carefully stored in the reader's memory, for though the sole real and ultimate causation of the special poisons of three of the complaints—viz., **Gout, Biliousness,** and **Rheumatism**—which we are about to consider, *must* lie in the faulty digestion of albumen, for their chemical composition shows that no other origin is possible, yet the proximate cause, that last straw whose weight brings out the disorder, is often to be traced to lead-poisoning, to heredity, to mental worry, etc., often so prominent, while the real

cause is so obscure as to delude the observer and lead to altogether false ideas as to the actual relations in the disorder between cause and effect, and this mistake may lead to a wrong line of treatment, and thus to serious disaster.

Let us view, in the order in which I have placed the liver functions themselves, the symptoms attendant on their breakdown.

1. The liver fails to convert, in fact to oxidize, completely one portion of albumen, and therefore, in lieu of urea, throws on the circulation a less oxidized substance, uric acid.

Uric acid, on entering the circulation, deprives the blood-current of many alkaline constituents by uniting with them, and thus forming various urates, of which urate of sodium is the most important.

It has a further effect attended with wide-reaching results. Uric acid and urate of sodium are very insoluble, requiring, according to temperature, twelve to fifteen thousand times their weight of water (!) for solution; urea is soluble in its own weight.

Let us see what must follow from an habitual production in excess of uric acid by the liver.

If the kidneys be very active, and the supply of water in the blood abundant, the subject of liver breakdown will pass urates and uric acid in large quantities; these may take the form of a colored (usually red) deposit in the urine, in worse cases that of **Gravel** or even of **Stone.**

But, it being supposed that overwork of the liver continues, and that mental worry or other proximate cause co-exists, a time will come when the hardly driven kidneys will, of necessity, begin to fail.

When that occurs, the uric acid, etc., will commence to accumulate in the blood, and, being very insoluble, will before long crystallize out in places where the circulation

is slowest and least active. It selects thus the old scars of wounds, the joint of the large toe in civilized tight-boot-wearing man, the inside of the knee in great riders, etc. This crystalline deposit sets up inflammation, and an **acute attack of Gout** occurs.

Very often, however, the various factors in gout do not tread so rapidly on each other's heels. The excess of food is slight, the liver breakdown but partial, entailing a loss of appetite that turns the patient against food, and thus retards the course of matters, and the kidneys are fairly active. Nevertheless, gout poison is all the time in the blood, setting up a long list of derangements, of which *acidity, depression of spirits, vertigo, epileptiform fits, tingling and numbness of the extremities, eczema, palpitation, neuralgia, flying pains, headaches, disturbances of sight and hearing*, etc., etc., are the commonest outward evidences. This constitutes **latent Gout** or **chronic Gout**, which may extend, often unsuspected, and without the production of a single acute attack, over a score of years.

There is no disease that latent gout may not simulate; fortunately the proofs of its existence are always obtainable from a careful analysis of the blood serum or of the urine.

In the course of prolonged states of gout such as I have referred to, deposits of urate of sodium (the so-called **Chalk Stones**) often appear on the joints of the fingers, the lobes of the ear, or the valves of the heart.

The prolonged irritation of the kidneys by uric acid, etc., is one of the great causes of the appearance of *contracted kidney*, a fatal degeneration better known as the **Gouty Kidney of Bright**, the commonest form of **Bright's Disease**. This failure of the kidneys is accompanied by a similar degeneration of the blood-vessels, and, to some extent, also of the heart. Gout is thus reckoned as one of

the causes of **Heart Disease** and of **Calcification of the Arteries,** and hence of rupture of a blood-vessel in the brain or **Apoplexy.**

To sum up: **Gout** *consists* in a peculiar inflammation of the joints and fibrous tissues associated often with depositions of urate of sodium (chalk stones).

It is *characterized,* in the acute stage, by *inflammation of a joint* or joints, attended with *great pain, swelling,* and *fever;* in the chronic stage by long-continued *ill-health* marked often by skin disease, *nervous and gastric disorders,* the occasional *passing of sand or gravel,* or by some one or more of innumerable symptoms, many of which may simulate very closely those of some graver disorder. This stage may last many years, and its existence is often indicated by distortion of the joints, especially of the smaller ones, the result of the deposit of the urates.*

The poison of gout is always the result of *mal-digestion of albumen;* its formation is favored by hereditary weakness of the liver, and by every other debilitating cause.

The acute attacks, being beneficial processes of Nature, end in the more or less complete removal of the poison; the chronic attacks lead to *skin affections, gastric disturbances,* etc., etc., and often cause death by inducing *degeneration of the kidneys, blood-vessels, and heart,* the advancing failures of which aggravate the gout, and themselves lead to a long list of secondary disasters.

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* At this point the author must seek to disarm the hypercritical by explaining that he follows the teaching of Bouchard in this treatise, while being well aware that very many theories, which reduce the part played by the liver in the production of gout, are existent and find influential support. All theories, moreover, agree in the identity of *uric acid* as the gout poison, all acknowledge a partial breakdown of the liver as a main, though not the *sole,* cause.

The treatment of gout, the next point that demands our attention, will not present any difficulties.

That of the chronic stage is safely and satisfactorily conducted on the following lines :

(*a*) Cut down the daily supply of albumen to as low a limit as is consistent with the maintenance of health. This may be done by several methods. To order a vegetarian dietary is the simplest and most effectual way,* but a sudden transition from a full meat dietary to a strictly vegetarian one is not always, except in the very robust, an absolutely safe procedure, and even then it requires some fortitude on the part of the patient to face it, especially during the first two or three months. To restrict meat to *one* meal a day, and to limit the selection to poultry, game, rabbit, or fish, will often suffice in mild cases of gravel, gouty neuralgia, etc. Free purgation, by constantly sweeping from the intestine much food that would otherwise be absorbed, acts well mainly by cutting down the dietary, and to send the patient to a purgative mineral spa effects the same end by the same means.

Whichever of the above courses be preferred, the following dietetic rules are applicable in every case. Eat plenty of fruit. Avoid a large admixture at one meal of different substances ; if meat be consumed, let it be eaten with bread or green vegetables and followed by fruit only; if milk puddings be desired, take them alone or with a little fruit. Breakfast should be the only *full* meal; all others must be restricted in amount. Avoid sweet wines or malt liquors, especially at meals in which meat is

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* In adopting the vegetarian régime the patient should obtain all necessary directions as to the cooking and the varieties of the necessary food from the Secretary of the Vegetarian Society, 75 Princess Street, Manchester, Eng., or from some other competent authority.

an ingredient. Tea, coffee, and cocoatine are allowable, as is sometimes whiskey or white natural wine, largely diluted.

In fine, great moderation in food is the first aim in the cure of gout, and simplification of the meals is a powerful adjunct thereto.

(*b*) Exercise in pure air should, according to the patient's strength, be indulged in, for muscular movement pumps the waste nitrogenous material from the tissues and leads to a greater intake of oxygen and a more perfect combustion of the foods.

(*c*) The next aim is to rid the blood of the uric acid. This is best accomplished by the simple method of drinking one or two quarts of hot water every day. It is sometimes advisable, especially in advanced cases, where the blood has been largely robbed of its alkaline salts, to supplement this treatment by a daily small dose of some one of the alkaline mineral waters, as those of Carlsbad, Vichy, Contrexéville, Kronenquelle, etc.

(*d*) Bathing is useful. A daily cold bath is often of service in rousing the nervous system, and a bi-weekly hot bath, or a weekly Turkish bath, in maintaining a properly pervious state of the skin.

(*e*) Climate and soil must next be looked to. A dry soil is essential to the cure of all cases of chronic gout, while, if the patient can afford it, he will do well to spend the winter and spring in a drier and warmer climate than is to be found anywhere in Great Britain.

(*f*) Finally, all conditions antagonistic to general bodily vigor, such as worry, anxiety, overwork, over-fatigue, great mental excitement, the atmosphere of gas-laden rooms, the contact with damp, residence on clay soils—in short, everything that our common-sense tells us tends to depress the bodily functions must, as far as possible, be shunned.

The *application* of the above measures will vary in each case. Often it is best, to secure all the desirable ends at one stroke, to send the patient away to a mineral spring. This will suffice to insure a restricted dietary, necessary exercise, freedom from worry, bathing, and a full supply of an alkaline fluid to the tissues. In many slight cases a mere reform in the dietary will suffice, a considerable reduction in the daily consumption of meat; while in others again, busy men, who are either unable or unwilling to step out of their ordinary routine for the purposes of cure, it will be necessary to order for a time some alkaline medicine, free purgation, and frequent Turkish baths. In cases where gout is due simply to debility, and, I repeat, these cases are rare, the removal to a bracing climate and judicious feeding up are the lines on which treatment should be based.

In the management of acute gout the wise man will view with great distrust all so-called treatment that is not built on the lines which Nature herself so plainly indicates in this painful but health-restoring process. There is local heat and congestion, foster it by the application of warmth; there is almost complete loss of appetite, take but the smallest quantity of the simplest food; there is thirst, drink copiously of bland fluids; there is difficulty in locomotion, keep absolutely quiet. Ah, but there is pain, says the sufferer. True; this is, however, the consequence of a symptom (inflammatory swelling). It also has its use, and, unless it seriously impedes sleep, is best not meddled with, for it will soon subside under the course of treatment recommended.

I am well aware that there are many attacks of gout, especially those which mark an advanced stage of the complaint, which call for more serious notice. A purgative at the commencement of the attack is in such cases advisa-

ble, and some stimulation of the kidney by small regulated doses of plain nitre or of sweet spirits of nitre is often also permissible, though a gouty man, accustomed to active, intermeddling treatment, will scarcely realize how slight, and at the best questionable, is the benefit he receives from medication. Morphia and colchicum seem, to those who do not know the *complete* results attendant on their administration, to be able to do wonders; but the conscientious physician, who has the real interests of his patient at heart, will be exceedingly chary in having recourse to these very doubtful friends, though when the dangers from prolonged pain exceed those which usually flow from the employ of powerful drugs, all scruples as to the careful use of the latter may cease.

Last of all, it must not be forgotten that there is a variety of gout, though it is an exceedingly rare one, which seems to be caused by destitution, by an all-round breaking down of the digestive and eliminative function, but this is rather the result of bad hygienic surroundings than of want of food. The cure lies in an improvement in the mode of life and the administration of simple but sufficient food.

2. The liver fails to supply in proper proportion bile acids to the bowel, for the necessary result of an excess in the albumen supply is an over-production in the bile-acid formation.* This produces the derangement known as **Biliousness,** which, like gout, is divisible into two well-marked stages, a chronic and an acute (or curative) one.

In relation to the formation and the course of bile, the following physiological facts must be noted :

(*a*) That bile consists of *solids*, mainly represented by

* Whatever doubts may exist as to the question of the formation of gout poison, there are none as to the fact here stated, that the amount of bile acids is increased by albuminous food.

bile acids, derivatives of albuminous foods, and of liquids and diluents, represented by salts and water.

(*b*) That bile in health travels slowly, and only at very low pressure, along the fine ducts which ramify among the cells, to unite in the large channel whose outlet is into the bowel.

What, then, must result when the solids (the bile acids) exceed their due proportion to the diluents? Surely a stagnation or an arrest of the bile-current in a greater or less number of the fine bile-ducts, a consequent swelling of the whole liver with a necessary impairment of all its functions, and a *defective flow of bile* into the bowel. In short, a general state of *block in the liver*. But we must go back even further. A block in the liver means a slowing of the current in, and a distension of, the portal vein and its tributary branches, hence a partial arrest of the powers of gastric and intestinal absorption with a resulting *decomposition of food in the bowel*, *loss of appetite*, and, in bad cases, the *formation of piles*, which are mere bunches of distended varicose veins. It is unnecessary to add that such a concatenation of evils is inconsistent with health; in point of fact, we have now reached a condition of matters known as **latent or Chronic Biliousness,** marked by *dyspepsia*, *lassitude*, *headache*, *depression of spirits*, and all the host of varying and variable symptoms dependent at bottom solely and entirely on the blocked state of the liver induced by dietetic excesses.

Now, how will this end? Just in the same manner that the very analogous condition of latent or chronic gout ended, in a crisis, an **acute attack of Biliousness.** The cells of the body endure the bad, and ever steadily growing worse, state of matters, till at last the vomiting centre in the brain becomes so irritated and stimulated that, after symptoms of severe headache, dimness of vision, giddiness,

etc., it sets up violent and *repeated retchings*, a process which, if sufficiently prolonged, effectually cures the whole disorder by forcibly *squeezing* the liver and compelling it to disgorge. That the act of vomiting produces a very powerful compressing effect on all the abdominal organs will be readily understood by us, for we know that, in the first instance, it suffices to forcibly empty the stomach, even to the last few drops of its liquid contents, and, if long continued, will even evacuate the bowel. But on no abdominal organ does the muscular strain of retching tell with more force than on the liver, for it, both by its position in the abdominal cavity, and by its size and solidity of structure, is, by mechanical laws, the organ that must bear the brunt of the compressing forces, and the result is an evacuation of its thickened bile and a copious discharge of this into the bowel. This is sometimes even regurgitated into the stomach, whence it is vomited; sometimes all is forced onwards in the bowel, which is stimulated to free action.

In acute gout and in acute biliousness we thus possess two admirable pictures of the bodily methods of self-cure.

The question of treatment will not long detain us, for that *of latent or chronic biliousness* is identical with that of latent gout.

(*a*) The dietary is the most important point. Rigid vegetarianism rarely fails to permanently cure, but not every one has the physical strength and adaptability of body necessary to face with impunity a *volte-face* of this magnitude; but the daily consumption of meat should be restricted, and large mixed meals of meat, fat, starch, sugar, and alcohol, must be given up. Fat will agree well with the bilious, starchy foods will also be well digested, and even albumen will give but little trouble if they be

not *all mixed* together in the one meal. That is the great truth to be borne in mind, not only in biliousness and in gout, but in every form of chronic dyspepsia.

Breakfast may be a good meal, for the digestive powers are, except in cases of that chronic dyspepsia called chronic gastric catarrh, which is usually the result of prolonged alcoholic excess, at their best in the morning. This meal may consist of some form of porridge and milk, bread, or toast, and butter, a little fat bacon or even a couple of eggs, and always, if possible, of some fruit. The beverage may be tea or coffee, hot water, or even largely diluted white wine (Hock, Moselle, Claret).

The midday meal must, especially in the case of busy men, be very light. Bread-and-butter, followed by a little fruit, and with coffee as a beverage, is a good form for it to take.

Dinner should not be taken till the labors of the day have been completed, and, if possible, forgotten, and should consist of fish or meat of a digestible character, with toast or stale bread, followed by one or more vegetable courses, and concluded with fruit. The beverage should be water, or a little lager beer, cider, or very dilute white wine.

There is rarely any necessity for more than three meals, but if some form of supper seem necessary to insure sleep, a light milk pudding or a few biscuits may be consumed before retiring.

(*b*) Exercise of an interesting, exhilarating nature and in the open air, systematic bathing, and the banishment of as many of the cares and worries of life, especially at meal-times, as is possible are the other means to be adopted.

Are drugs necessary in chronic biliousness? Not as a rule, for if the over-supply of food to the liver be arrested, that organ will soon, at least in all but severe cases, dis-

gorge itself slowly, and this latter process will be assisted by the salts and water contained in vegetables and fruit, and by the more regular evacuation of the bowels, which will, by the same measures, be also secured. At the same time, a bi-weekly dose of some mineral water, rich in salines, such as Hunyadi Janos, Æsculap, Carlsbad, etc., or a teaspoonful of Carlsbad salt dissolved in half a pint of hot water, and consumed slowly before breakfast, is permissible, and will often hasten the return of health.

The management of acute biliousness, of the bilious attack, as it is generally called, must, like that of the acute gouty attack, be conducted on the lines of common-sense. To do nothing is generally the best course to pursue, but if a line of treatment is demanded, let it be a close imitation of the disorder. The patient feels sick, let him favor vomiting by taking large draughts of tepid water containing a little ipecacuan wine* or a small quantity of salt. He feels a tendency to diarrhœa, let him take a full dose of some simple saline, such as citrate of magnesia, if he dare not face castor oil. He has no appetite, let him fast; he is thirsty, let him drink water; he finds walking difficult and noise trying, let him lie down and be quiet. Tris-nitrate of bismuth (a salt-spoonful in fresh soda water or in barley water) is permissible if irritation of the stomach and intestines persists for long after other symptoms have subsided.

Such is biliousness, closely akin to gout in its causation, course, and means of cure; and I speak from a large experience in these special disorders, when I state that 90 per cent. of the total number of sufferers from either of these

* Half a teaspoonful of ipecacuan wine to each tumbler of water, to be repeated at intervals of half an hour till the desired effect is produced, is an efficient method.

complaints may cure themselves by attention to the simple rules which I have laid down; the odd 10 per cent. being incurable because the disease has lasted too long, and has induced severe degeneration of the liver, kidneys, etc.; and in them to cut the diet down to the level of those enfeebled organs would simply mean slow starvation. For this latter class the doctor's only aim and hope lie in an amelioration of their condition by a reduction in the grosser dietetic excesses, and the alleviation of inevitable discomforts. But even of the 90 per cent. but a certain proportion recover, and yet all express an ardent wish for a return of health. Why is this? Because they will not face the treatment. Few of my younger readers know the difficulties, the pains and penalties involved, in the path of reform of the habitual sinner whom habit has fixed as in a vise.

Starting life with an inherited feebleness of the liver, the rich, in order to avoid gout, must perforce practise the utmost abstemiousness. To think that this course induces permanent weakness of body or mind is a mistake. The opposite is the truth: mental vigor, physical well-being, and prolonged life, free from those troubles so frequent in old age as to be considered natural to it, are the meed of the ascetic.

But before dismissing the twin subjects of gout and biliousness, I must briefly refer to two forms in which all disease may make its appearance, and which have a special significance in these disorders.

I have hitherto spoken of chronic gout and of chronic biliousness as if these states always ended rapidly and safely in acute attacks, in the "*crisis*" of the older medical authors. Unfortunately, this is not invariably the case, and both these disorders may remain for many years, the sources of innumerable discomforts, without any such de-

termined and powerful expulsive process as an acute attack being induced by natural means.

There are individuals, as there are nations, whose living units are so little impressionable that evils accumulate among them without exciting to a vigorous and healthful counter-demonstration, and in such manner to a cure. There is evident discontent, but not rebellion. This type of individual is well known in every department of medicine, and is exceedingly common in those of gout and biliousness. The diagnosis of a complaint in such people is often difficult, and the treatment requires great tact. The patient may present himself in any form, sometimes as a chronic dyspeptic, at others as a hypochondriac, at others as the subject of intermittent or persistent depression of spirits, or again as an epileptic, a consumptive, a diabetic, an asthmatic, or even as an actual lunatic. Nor is this in any sense an exaggerated, or even a completed, list. How many persons of manifestly unsound minds get well, without physic, and simply by the enforced observance of those rules which I have laid down for the treatment of chronic gout and chronic biliousness? At least one fourth of those sent to asylums. If you misfeed the nervous system you produce derangement of its functions, and this is but another term for insanity. Consult any book on physiology, and you will find that the food-system of the body is the *sole* source of healthy function; the brain and nervous system are but offshoots of a tree whose roots and trunk are represented by the food system. Nowhere in the domain of living things do we witness a nervous system existing independently of, or except as a branch of, the parent food system, while throughout the vegetable, and in some of the lower members of the animal kingdoms, we may see active life in progress in the entire absence of either nerves or nerve-cells.

How, then, may chronic forms of gout and biliousness be diagnosed when present in these Protean shapes? I shall not attempt to lay down any rules for the reader's guidance except the following common-sense one: when the symptoms of lunacy, epilepsy, diabetes, melancholia, hysteria, or hypochondriasis present themselves, and there is *no evidence* of any organic disease to account for their presence, as also when disorder in the chest or abdomen is apparent without some evident and sufficient cause, the chances are immensely in favor of the supposition that mal-nutrition of some one or more parts of the body, or some secondary temporary derangement set up thereby, is at the bottom of all the phenomena, and such should be diligently sought for. To people who have never witnessed it, it may appear at first sight incredible that in some simple but prolonged dietetic errors can reside the sole causation of derangements which the text-books would have us believe are *always* dependent on some terrible, and generally incurable, lesion. Let any medical man who may imagine that I overstate my case, do what I have done, investigate some of the reported cases of the cure of what are usually reckoned as incurable ailments, by means of the purgative remedies of quacks, and he will discover that some of the cases are literally and absolutely true. He will find himself confronted every now and again with people who can produce absolute evidence that eminent medical authorities have regarded their cases as past hope of cure, and who yet, when so many boxes of pills or so many bottles of physic (usually a great many) had been consumed, have undoubtedly got well, and remain so. The efficacy of the treatment lay not in the physic, but in the method; the purgation prevented largely the absorption of food and gave the excretory organs time to rid themselves of accumulations of various irritating and poisonous

material. There can be no doubt but that the ancient physicians, who were keen observers, and not remarkable for mendacity, in this way occasionally scored the most brilliant successes, which encouraged them to persevere in free purgation, emesis, and blood-letting, and while we may all agree that they rode their hobby — and their patient — often to death, there can be no reason why we should not extract from their practice the useful lessons which it contained.

Within the past six months it has been my lot to come across two gentlemen, a military officer and a Scotch lawyer, in the former of whom St. Vitus's dance, in the latter of whom incipient locomotor ataxia, were diagnosed by more than one distinguished physician, and yet both of whose cases were speedily diagnosed as, and treated for, latent gout, the first by a London, the second by an Edinburgh surgeon. Both recovered promptly and completely. Nor was there left in either case any element of doubt as to the truth of the diagnosis, for both got rid of the uric acid in tangible shape and were almost immediately restored to sound health.

But what about the treatment of those cases of latent gout and biliousness in which the body will not rouse itself to expel the enemy? Once convinced of the diagnosis, serious treatment must be commenced. In gout the best of all plans is to send the patient straight off to a powerful mineral spring, such as that at Carlsbad or Vichy; in biliousness the same line may be followed, or the alternative of a short sea voyage may often with advantage be adopted, for a few hours of violent sickness will do more for the removal of chronic biliousness, by the induction in sea-sickness of a substitute for an acute attack, than months of home treatment.

3. The third function of the liver in the order in which

I have placed them, is that concerned in the supply of serum albumen* to the blood, which conveys it to the tissues for their nourishment.

If the supply of albumen to the liver be in excess, it is but reasonable to conclude that, unless the organ be greatly incapacitated, an excess of serum albumen or plasma will be thrown on the blood. To what results will this tend?

The first result will undoubtedly be an increased activity of that chemical action which takes place ever between the living cells and their albuminous food, the external evidences of which will be felt in a sense of well-being and of exaltation of all the physical powers. We all know how very different is the sensation after a full, from that experienced after a restricted, or a purely vegetarian repast. Fasting and abstinence from that richly albuminous food, meat, have in all ages of the world, and in every strict religious community, been rightly valued as powerful aids in subduing the human passions, while even among animals it is to be remarked that the carnivores are infinitely more combative and fierce, even when not urged thereto by the cravings of hunger, than are the herbivores. The lines of Pope in condemnation of the slaughter of animals for the purposes of consumption and the consequences thereof will be familiar to many :

> "But just disease to luxury succeeds,
> And every death its own avenger breeds ;
> The fury-passions from that blood began,
> And turned on man, a fiercer savage, man."

The consumption, then, of a constant excess of albuminous food leads very naturally, provided the stomach and liver be not extensively deranged, to an over-production of serum albumen in the blood, and a consequent stimu-

* Serum albumen is here used to designate what physiologists generally call liquor sanguinis.

lation of cell activity, all of which symptoms are most marked in cases where meat forms the principal source of the albumen, for the albumen of meat differs from that found in vegetable seeds, inasmuch as it is more easily absorbed, is more complex, and is found in conjunction with certain stimulating nitrogenous extractives of which creatin and creatinin are the chief.

But the second set of results which depend upon an excessive formation of serum albumen are far more formidable than those which I have just referred to. An increased supply of serum albumen means of necessity also a corresponding increase of waste and débris to be cast forth from the body. Now, in Chapter VI. we studied the course of such waste from the time of leaving the cells to its final exit from the body. It falls first into the spaces round the cells (lymph interspaces), whence it is pumped by the various movements of the body along lymph channels into the veins, which conduct it finally to the kidneys for excretion. This débris is of a crystalloid nature, and immediately on leaving the cells consists of a chemical compound technically known as an amine, which undergoes various changes as it travels towards the veins, and by the time it has reached that point, has, in health, been transformed to the same substance as that other part of the albumen detained by the liver—namely, to urea. But suppose now that a constant excess of these amines is being poured out from the cells, and that furthermore this occurs within the body of an inactive man, one, in short, who is not keeping those great lymph pumps, his muscles, and those large lymph receptacles and pumps that exist in the joints, round the lungs, round the heart, and round the bowels, in active working order—and what must, of necessity, ensue? An accumulation of waste near and round the cells, and a failure in its conversion to urea and in its

due passage forward to the veins. As a matter of fact—though we cannot trace the chemical process—we know that the detained waste material undergoes a partial conversion to *uric acid;* this is the main poison which results from such detention, though there are doubtless other secondary ones. This state of matters occurs generally in a muscle for the following reason, that, of the actively living portions of the body the muscles form a markedly predominant part, and that the lymph channels are necessarily very much longer in the muscles, and especially in the long muscles of the limbs than elsewhere. This length of channel favors obstruction, stagnation, and the mal-production of urea.

Now let us consider what will be the sequence, as regards the patient, of such a state of matters as I have sketched. Firstly, there will be muscular stiffness and pain, in fact, **Muscular Rheumatism;** then, if the state of matters be very bad, much of the uric acid, etc., will be poured into the nearest lymph receptacle, that round the joint. Here it will set up *swelling* and *pain*, and we shall have established a state of **Acute Rheumatism,** popularly called **Rheumatic Fever.**

But the mischief does not confine itself to one joint. Once started in the lymph system, it augments by leaps and bounds, some think by a process of fermentation set up by a micro-organism, and travels to other joints, or even sets up mischief in those large lymph receptacles which line the lungs and diaphragm, the brain and the heart, thus producing those very common concomitants of rheumatic fever, **Pleurisy, Heart Disease,** and **Inflammation of the membranes of the Brain** (rheumatic meningitis), etc.

Such are the causation, course, rationale, symptoms, and so-called complications of rheumatism, acute and chronic.

Its real underlying cause is, according to the latest and

the best authorities, *uric acid.* For long it was held that lactic acid, often found in excess in the blood of the rheumatic, was the actual *materies morbi*, but this has been found to be a mistake. It is to be regretted that many popular medical books, even those written by scientific men, still rank damp, worry, anxiety, etc., as sufficient causes. These latter conditions play the same part in *developing* rheumatism and gout as they do in developing the symptoms of mercurial and of lead poisoning. The poison is already in the tissues, and the unfavorable conditions of damp, etc., by hampering the action of the skin, of the nervous system, etc., merely bring out the enemy, compel him to show his colors, earlier than he would otherwise have done, but cannot create him. The researches of Lehmann prove beyond doubt that the fibrine of blood (*i. e.*, a portion of the serum albumen) is increased largely by a dietary in which meat is much represented, and that in rheumatic fever as much as ten parts per thousand of fibrine have been found in the blood, as against three parts per thousand, which is the average of health. Knowing, then, that uric acid is *the* poison in rheumatic fever, and is always a result of an arrested metamorphosis in the final stages which albuminous food undergoes, and that any increase in the consumption of such food is followed by an increase of fibrine, and that such fibrine in an attack of rheumatic fever exists always in excessive amount in the blood-current, we are at least justified in holding that there is a distinct connection between a large consumption of albumen and the production of rheumatic fever. Furthermore, there is overwhelming evidence that, other things being equal, a restricted dietary has a most powerful effect in averting the attacks.

But it is impossible to dismiss so briefly the discussion of such a universal complaint as rheumatism. Let us first

trace the cause of the chronic rheumatism so commonly witnessed in the aged, and usually in those who have passed hard lives and have fared badly. If rheumatism be even distantly related to over-eating and to want of exercise, how is it that the hardest worked and the half starved form the bulk of the sufferers? Such is the question. The answer is an easy one.

The two closely allied complaints, gout and rheumatism, have each a poison, uric acid. The sole, the only possible source of this acid is albuminous food, and it is produced whenever the amount of albumen consumed is in excess of the digestive powers.

Therefore, weakness of the digestive functions, in other words, weakness of the whole body—for the digestion goes on throughout every portion of the body—may cause either of these complaints quite as easily as a gross excess of food.

Once produced, if the kidneys and skin remain active or their functions be not subjected to sudden interruptions, many years may elapse ere the symptoms of either complaint will be developed.

Want, therefore, equally with luxury, excess of exercise equally with a deficiency thereof, may furnish favorable conditions for the production of gout and rheumatic poisons, while deficient clothing, exposure of the skin to sudden and chilling draught, damp, worry, anxiety, want of sleep, old age, alcoholic excess, in fact anything or everything that interferes with the excretory powers of the body or lowers its tone, will precipitate the attack.

Then we have many varieties of rheumatism or pseudo-rheumatism, for the poison is probably *not* in any of these cases uric acid. The following are the principal ones:

Fever rheumatism. The aching of the joints which commonly precedes all feverish attacks. The poison in each case varies with the fever.

Scarlatinal rheumatism. Usually a pseudo-rheumatism, sometimes a real acute rheumatism, which makes its appearance in the middle and towards the end of the fever.

Lead and mercurial rheumatism, due to the presence of those minerals in the tissues.

Syphilitic and gonorrhœal rheumatism, due to special venereal poisons.

Rheumatic Gout. — This complaint, with a misleading name, has no connection whatever with either gout or rheumatism, but is a chronic inflammatory affection of the joints, of unknown causation, and exceedingly persistent and intractable.

The line of treatment in rheumatism will now be clear to us and will be found to coincide very closely with that which has received the sanction of popularity.

The Treatment of Chronic Rheumatism.

(*a*) The removal of the cause is very naturally the first object. In all but the old or the very debilitated, the dietary should in the first instance be revised. Meat food should be taken only at one meal, and should then be consumed with bread or toast, and followed by vegetable and fruit courses only. Potatoes, milk puddings, and sweets generally, should at this meal be shunned. In the very robust, especially if acute rheumatism threaten, it is well to insist for a time on a rigid vegetarianism. The result will nearly always repay the first trouble and discomfort attendant on the dietetic change. Sweet wines, malt liquors, and usually all forms of alcohol, must be avoided. The cause of the specially deleterious effects of such beverages on weak digestive organs will be referred to in future pages.

(*b*) Exercise, to assist the muscles to get rid of their accumulations of waste, must, if no fever be present, and

sometimes even in the face of pain, be insisted on. Enforced active exercise will often suffice to cure very old-standing cases. If the patient be, however, old or very feeble, great caution is required, lest over-fatigue be induced, and in their cases thorough massage (*i. e.*, passive muscular exercise) may replace other forms of exercise.

Local rheumatic pains are best dispelled by firm, prolonged, and repeated frictions. Galvanism may be substituted if friction fails, a fairly powerful current being passed through the muscle for three to five minutes, thrice daily.

Sometimes it is well, in addition to the mechanical friction, to avail ourselves of some remedy which shall relieve the congested state of the muscles by deflecting some of its contained blood to the skin. For this purpose some one of the stimulating liniments in frequent use may be employed. A drachm of menthol, dissolved in a couple of ounces of the common soap liniment, acts well, while, for severe cases, 3 drachms of menthol, 4 drachms of pure chloroform, and 9 drachms of olive oil may be safely used. The friction is of much more importance than the variety of liniment employed.

(*c*) Bathing, by keeping the skin in a condition of excretory efficiency, is also of importance. For the young and robust a weekly vapor or Turkish bath, is often advisable, while for the middle-aged, or the elderly, frequent warm baths (one every night or every second night before retiring to rest) are usually serviceable. Even a cold morning tub, by producing as its secondary effect flushing of the skin, is a measure of treatment of which the young may, if the subject of slight rheumatism, avail themselves. In old chronic cases the hot seaweed baths at Ramsgate, or the warm saline baths at Buxton, Bath, or Ashby-de-la-Zouche are useful.

(*d*) Clothing is a subject of great importance, both in chronic gout and in the same form of rheumatism. It is desirable that sudden chilling of the skin should be avoided, and that a stratum of warm, dry air should envelope the body. This can best be secured by flannel or silk underclothing. In the case of chronic sufferers the flannel may beneficially be rough, as it then plays the part of a mild cutaneous irritant. This property of irritation possessed by the rougher flannels is, however, a drawback sometimes to their use, and people of sensitive skin have often to interpose a lattice-work cotton garment between the skin and the flannel, or to substitute material such as merino, made from the finer, softer wools, or silk garments, for the coarser flannel ones. The under flannel garment should fit *loosely*.

(*e*) *Climate.* The importance of climate in the treatment of a disease which is so readily brought out by anything, such as the presence of much moisture in the air or sudden changes in its temperature, that hampers the action of that very extended excretory layer, the skin, is, it will be readily understood, very great. The persistence of very many cases of chronic rheumatism, in the face of all measures, however wisely chosen for their relief, is often due to the simple fact that the sufferers reside on a damp, usually a clay, soil. Such cases cure themselves spontaneously upon change to a dry soil, and when this can be secured, in conjunction with a warm, sunny climate, the gain to the invalid is always assured. In Great Britain, Ventnor, Bournemouth, Hastings, and St. Leonards may be mentioned as among desirable winter resorts; while of the foreign ones, Rome, Naples, the Mediterranean shores, Upper Egypt, Helouân near Cairo, or Hamman R'hiva in Algeria, the two latter places, being especially suitable both for their climate and for their celebrated hot baths, are to be commended.

(*f*) Medicinal agents may sometimes with good reason be had recourse to in chronic rheumatism, especially in the case of those, the vast majority of sufferers, who are from poverty more or less debarred the employment of the more reliable and only permanent means of relief, those to which I have already drawn attention. It is certain that good is often derived, especially in localized rheumatism, from prolonged friction with some mild skin stimulant. In very obstinate cases it is justifiable to go even beyond this point and apply counter-irritants. Of these, very hot moist bran poultices, covered with flannel or some waterproof material, and applied continuously for a day or two, if necessary, to the seat of pain, often effect a ready cure; while in other cases, a very small blister, or series of small blisters, a fresh one being applied each day in the close neighborhood of the last, or a mustard-leaf, or a few applications of liniment of iodine, or a single touch of Corrigan's hammer, or of the dermo-puncture—the former a metal button which, after it has been immersed for a minute in boiling water, is applied momentarily to the skin over the seat of pain; the latter an arrangement of needles which, released by a spring, pierce the skin and are at once retracted—or a few jets of the vapor of chloride of methyl, are sometimes very useful, though I deprecate strongly the use, but in cases of great severity and where the pain is purely local, *e. g.*, in sciatica, of such strong measures.

Internal remedies are rarely called for. The young and robust may, however, ofttimes, to their advantage, take a tri-weekly dose of some purgative saline mixed with a large quantity of water, while the mineral waters of Bath, of Buxton, of Strathpeffer, the sulphurous waters of Harrogate, the iodized waters of Woodhall, the alkaline waters of Vichy, and the antacid springs of Carlsbad will often, when *the patient consumes these waters at their sources*, but rare-

ly under other conditions, avail to relieve very considerably the most chronic cases.

Such are the lines of treatment from which a selection may be made, but it is necessary here to add the proviso that, in a certain number of special cases, all of them may, from various causes, fail. Who, after all, are the great martyrs to rheumatism and fill the air of the out-patient departments of our hospitals and dispensaries with their lamentations? The elderly and aged poor; those who have led hard lives, who have worked excessively and fed indifferently. Their bodies are prematurely broken down; their muscular tissues clogged with all forms and varieties of irritating nitrogenous débris, while the present need of suitable nourishment, of proper clothing, of pure air, and of sufficient rest, renders their temporary relief doubtful, and their permanent cure, under the persistence of such evil conditions, an impossibility. Rest, warmth, and simple suitable food are the first conditions to be secured, and the cure may be expedited by counter-irritation and by the administration of some tissue stimulant, of which the best are iodide of potassium, chloride of ammonium, and guaiacum. The two former may, with great advantage, be given together, thus: Take of iodide of potassium and of chloride of ammonium, of each, 1 drachm; of syrup of orange, 2 oz.; of compound tincture of Peruvian bark, 1½ oz.; of caraway water, 2½ oz. Mix, and direct that a small tablespoonful in plenty of water be taken trice daily.

The above mixture may, if necessary, be continued for as long as a month, and is of remarkable temporary benefit in old-standing cases of rheumatism, as even in those of chronic gout and chronic biliousness. Sometimes in the old and very weak the following is, however, prefer-

able. Take of ammoniated tincture of guaiacum, 4 drachms; of tincture of orange-peel, 2 drachms; of mucilage of tragacanth and of cinnamon water, of each, 3½ oz. Mix, and direct that two tablespoonfuls be taken in water thrice daily.

Treatment of Acute and Sub-acute Rheumatism.

The remarks made on the subject of treatment when acute gout and acute biliousness were the complaints in question, apply with equal force to acute rheumatism.

The disease, painful and prolonged though it generally is, is nevertheless the shortest and easiest route to health, consistently with complete recovery, that has yet been discovered.

The line of treatment must again be traced on the lines of Nature. The swelled and heated joints should be enveloped in cotton-wool, over which it is an advantage to fasten gutta-percha, or other waterproof tissue, or they may be encased in very hot bran bags, frequently changed.

The intensely acid and copious perspiration, peculiar to the complaint, must be fostered by flannel clothing, by a dry, warm temperature of the bedroom, and by copious draughts of water. Absolute rest is essential.

The diet, of course, must be of the lightest. In cases in which simple treatment only is adopted, light soups and broths, malt extracts with water, barley water, rice water, cocoatine, and fresh, ripe, digestible fruits in small quantities should form the mainstay. You cannot feed a patient up in fever; you may in truth stimulate him by administering a profusion of meaty substances rich in stimulant properties, but you cannot, by the mere supply of food, compel the cells to unite with albumen as in health. Even in mild forms of fever this process is very considerably impaired, while in severe cases a breaking down of

the cell-tissue only is in progress, no reconstruction whatever taking place. In some cases a milk diet may be tried, from two to five pints of this fluid, with an equal quantity of soda or potash water, being a daily allowance. But if a one-substance diet is to be undertaken, let it consist rather of buttermilk than of milk. I have treated about a score of cases in this way, allowing from one to three quarts or more of buttermilk, or, where this is distasteful, one or two large bottles of koumiss,* to be consumed per diem. In these cases I have administered, in addition to this, neither nourishment (beyond, in one or two cases, a little bread, toast, or ripe fruit) nor medicine, and the results have been most satisfactory.

As regards the administration of medicine, I have little to advise beyond extreme caution, and the exercise of much patience ere recourse be had to it at all. Remember that the complaint is both beneficial and *protracted*, and that if the patient is fairly convalescent in eight weeks, he may be considered to have done well. The best treatment is that which does nothing, and the next best that which does little, and of the latter order first in rank may be mentioned the lemon-juice treatment. Half an ounce of this fluid, quite fresh, should be administered in water without sugar, night and day, every four hours. In cases where this line is adopted it is not advisable to administer either buttermilk or koumiss. With regard to the so-called alkaline and salicylic-acid treatments, I have nothing good to say. The former is depressing and considerably increases the period of convalescence, while, in the majority of cases, it has no noticeable effect in even relieving pain. The latter—the employment of salicine, salicylic acid, and the salicylates—is every day losing its votaries,

* Koumiss contains a variable amount of alcohol.

in view, among many other drawbacks, of the extraordinary depression, the frequent relapses, and the long subsequent stage of anæmia which this line of treatment always entails. Both colchicum and salicine, with their derivatives, belong to an exceedingly dangerous class of drugs, and their danger lies in the seductiveness of their primary effects. They have both been proved by unanswerable experiments to be, mainly, potent bile stimulants. They stimulate, in short, the bile-forming function of the liver, and cause, therefore, of necessity, a temporary check in the production of uric acid, when, as in gout, this substance in place of urea is being poured into the blood-stream, and they consequently also arrest more or less the supply of serum albumen to the tissues, and thus check temporarily the symptoms of rheumatic fever. But such stimulation can have but one result, a temporary arrest of symptoms —which symptoms, be it noted, are admitted by all, at any rate in gout, to be beneficial—at the expense of only a partial recovery and of an early and severe relapse. The public have long ago discovered by painful experience the truth of these statements in regard to colchicum in gout, for the disease is a common one, and the remedy is of old standing; in that of salicine compounds the real state of matters is only now being suspected. So far from being, what their admirers concluded from the review of these drugs through the rose-colored glasses of hope, antidotes to some fancied microbe which was laying waste the kingdom of man in rheumatic fever, it has been found that, in order to maintain the relief of pain, the use of the drugs must be vigorously kept up, a necessity quite incompatible with the microbe theory unless its supporters were prepared to "go one better," and to assert that the supposed microbe was also a supposed phœnix. But, as I have already said, the absurd pretensions as to the powers of the

salicine compounds find every year fewer supporters. The therapeutists are steadily, in each new edition of their works, less inclined to commit themselves to the miraculous powers of these drugs, while Dr. Latham, Professor of Medicine at Cambridge, and a man who may be classed as a specialist of the first rank on the subject of rheumatism, in his learned Croonian Lecture in 1886, on gout, rheumatism, and diabetes, did not consider them, among rational methods of treatment, as worthy even of a passing reference.

Nevertheless, there exist cases in which both the salicine compounds and the colchicum preparations may be employed, just as there exist derangements in which brandy, whisky, rum, etc.—though to their incautious use is due much of the physical suffering we every day witness, and perhaps the very diseases we may happen to be treating—may be used as means of relief to tide over a critical period. There is no form of matter in the world that is, as regards man, intrinsically good or intrinsically evil, all are relative benefits, and the duty of the thoughtful man is not to brand any one of them with indiscriminating reproach or praise, but to point out, for the benefit of others, the true, and often very restricted, limits within which, in any given class of cases, every one of them may find useful employment.

But before I finally dismiss the three derangements—gout, biliousness, and rheumatism—so intimately related both in their causation and in the phenomena to which they give rise, I must refer to two important groups of symptoms common to all of them. The first of these consists of :

The Skin Derangements consequent on Chronic Gout, Rheumatism, or Biliousness.

To the reader who has carefully followed me thus far, it will not come as a surprise to be told that, as the skin is

a blood-purifying organ in as true a sense as the lungs and kidneys, upon it will fall, when the kidneys fail, as they do so frequently in these allied complaints—but most commonly of all in gout—an increased strain, and that such strain, when long continued, will lead to symptoms of derangement in those parts upon which it, for some special reason, most of all tells. How often do we not witness in a class of man who is evidently over-fed, and who is always complaining of a number of vague ailments referable to his liver, but not clearly definable as either gout, rheumatism, or biliousness, that the least interference with the action of the skin, the incautious application, for example, of a plaster for some vague pain, will produce rapidly a crop of **Eczema**, and how often do we not see the same complaint among the children of the ill-fed poor!

I shall not attempt any classification or even any enumeration of skin diseases in this place, but shall simply say that whenever any individual witnesses on his skin any sign of over-action—*i. e.*, congestion or inflammation—from the smallest pimple, or the simplest boil, up to the most general and intractable case of chronic psoriasis, and that such symptom is not clearly traceable to the presence of some animal parasite (such as the itch-insect) or of some vegetable parasite (such as one of the varieties of tinea which are the sufficient causes of ringworm, honeycomb-ringworm, barbers' itch, liver spot, or circumscribed baldness), and the sum total of all such parasitic affections do not go to make up one tenth of the total number of skin diseases—he may rest assured that his skin has for long been making strenuous efforts to eliminate some poison from his blood-stream, and that some, often very trifling, extra task thrown on it has resulted in a local breakdown of the organ, generally, of the nature of a temporary *cura-*

tive inflammation, but sometimes of a permanent degenerative form, the result of old-standing disease and persistent and unsuspected overwork of the skin, aided perhaps by congenital weakness of that part.

The rational treatment of all skin disease consists in finding first of all the special poison present, in tracing its source, and in preventing its further formation in the body, and then in eliminating from the body the poison already contained therein.

How often have I not heard a protest raised by some old woman in the out-patient rooms of one of our large hospitals against the attempt made by some youthful medico to plaster up with some form of unguent a recent and violent attack of inflammation of the skin (*i. e.*, eczema), and what a smile of scorn have I seen passing over the features of the said Æsculapius. Nevertheless, the old woman must be impartially adjudged to be in the right. To "drive in the complaint"—for such is the phraseology, also strictly correct, of the aged female—is to excite in its stead bronchitis, diarrhœa, or the much-dreaded "fits." A very slight knowledge of physiology must convince every one of the reality of this risk. That inflammation of the skin is but the effect of an adequate cause, to be sought probably in some dietetic error, no one will venture to doubt, and that to leave the cause in operation while attempting to remedy the local effect, is but to divert to some other organ—at first probably to one of allied function, such as the lungs, but possibly to the brain—the said effect.

In youth, all that is necessary, all that can be beneficial, in the way of treatment in skin disease, is to give such directions as shall insure to the sufferer the known conditions necessary to general health. When these have been secured, and the *materies morbi* actually present have been

removed, then it is time to treat the local skin disease, if it then remain, which is extremely unlikely.

The Lung Derangements consequent on Chronic Gout, Rheumatism, or Biliousness.—We have seen why it is that pleurisy is a common and well-recognized complication of acute rheumatism. There can be no doubt but that many of the attacks of *pleurisy* that come on without assignable cause are due also to one or other of the three above-mentioned complaints, existing in their latent condition, but I should be wrong to say that as yet the connection between it and them can be in every case accurately traced. *Bronchitis*, however, in all its forms, and *asthma* (of one variety, that connected with a transient congestion of the mucous membrane of the bronchial tubes), as also several forms of laryngeal derangement, have long been recognized as common gouty and rheumatic symptoms, and scientifically tracked to such origin. In biliousness of the chronic form both lung and skin derangements are comparatively rare, for the special derangements in this complaint are more localized, being confined more strictly to the liver, than are those attendant on gout and rheumatism.

I need scarcely add that all lung complaints, like all skin disorders, which are due to the existence of poison of any sort in the blood, are of the nature of benefits, and that the sole rational line of treatment is first to cut off further supplies of the poison, and then to rid the body of that amount with which it is already encumbered, by either wisely aiding and abetting the development of such symptoms as may be present, or by attempting to set up, in some organ of similar function, but of less importance to life, such as the skin, similar symptoms, and thus to relieve the great strain thrown on the breathing apparatus. To attain these ends, while soothing the lung tissue by warming and perhaps moistening the atmosphere, we apply lin-

seed meal or mustard to the skin of the chest, we reform and simplify the dietary, and we administer hot demulcent drinks to favor expectoration, or even recommend a few doses of ipecacuan or antimonial wine.

The great facts, then, that we must keep in mind are, that the kidneys, skin, and lungs are all excretory organs, each in health provided with its own special amount and variety of work, but each, when the action of either of the other two is impeded, liable to be called on to undertake extra duties, and thus to become itself overstrained and at the mercy of a slight adverse force—in the case of the skin, the application perhaps of a strong soap or the rubbing of some article of apparel; in the case of the lungs, a sudden fall in the temperature or the prevalence of a cold, dry, east wind—which may suffice to produce disease.

Neither ordinary damp, nor cold, nor fog, nor worry, nor anxiety, nor any other condition nor state, can produce the poison of gout, rheumatism, or biliousness, neither can they or any one of them produce in a healthy individual, whose ancestors like himself have been accustomed to live in a climate where such conditions are commonly met with, any disorder, but, when certain tissues of the body are *already* disordered from overwork, they may act as *determining* causes of the outbreak. To the wide variations in climate and temperature, etc., the Englishman owes his vigor of body, and especially that adaptability of his cells which makes of him an excellent colonist. Placed under what the hygienists would call *better* conditions, he would actually degenerate in those great qualities which have made him the pioneer of civilization, while the health of the race—a state of equilibrium which has, of itself, nothing to do with muscular vigor or even but remotely with adaptability—would, after the difficul-

ties of acclimatization have been surmounted, remain much as it is at present.

There are yet many, but less important, dependencies of the three diseases of which I have been treating, a detailed description of which would delay us too long, and whose connection with gout, biliousness, and rheumatism is not always quite direct. Of these **Quinsy**, some neuralgias, various forms of headache, many varieties of **Epilepsy**, might be quoted as instances, and these will receive necessary attention when the question of the degenerations of the organs in which they occur comes before our notice.

There remain for us to consider two important liver functions, either of which may fail as a result of excess.

4. *The glycogen-storing function may become disarranged.*—Let us make, first of all, a brief study of this function, and then we shall be able very clearly to trace the genesis of the symptoms which ensue on its failure, and to distinguish from each other two very different complaints, **Temporary Glucosuria** or **Functional Diabetes**, and **Permanent Glucosuria** or **Organic Diabetes.**

All the carbo-hydrate section of the fuel-foods — *i. e.*, the starches and sugars—when they reach the liver are arrested and stored as glycogen or animal starch. Glycogen is a colloid, and cannot pass on through the liver-cells into the general blood-current. After each meal a quantity of this glycogen or animal starch is thus stored up.

Now, the liver has two blood supplies: the *portal vein*, which brings to it the albuminoids, carbo-hydrates, salts, and water, absorbed by the bowel; and the *hepatic artery*, which conveys to its cells, for their nourishment, ordinary arterial blood. This latter blood, like that in every artery of the body, contains a ferment, diastase, identical with the ferments ptyalin in the saliva and amylopsin in

the intestine, and which has thus the power of converting starch to grape-sugar. Therefore, the liver stores three or four times a day—*i. e.*, at each meal-time—a *large* supply of animal starch, and the branches of the hepatic artery incessantly convey to the liver-cells, in which that starch is stored, a *small* supply of a ferment which changes starch to sugar, the result being that the body, constantly in movement of some kind, and therefore constantly in need of fuel, has incessantly supplied to it from the stores of starch, intermittently laid up by the liver, a small, regulated supply of grape-sugar, which it consumes.

But suppose that, a very large amount of starch and sugar having been eaten, an excess of grape-sugar beyond the glycogenic power of the liver should reach that organ. What will ensue? A portion of such grape-sugar will pass on into the general blood-stream, and we shall have an excess of grape-sugar (or glucose) in the blood, and such excess being beyond the combustion powers of the body, and sugar being a crystalloid, will pass out by the urine—in other words, we shall have **Glucosuria.**

It is evident that if the liver be already debilitated as a result of gout or biliousness, that this condition of glucosuria may ensue on even a normal consumption of sugar and starch.

It is also clear that if, from any cause, an excess of arterial blood be conveyed to the liver by the hepatic artery, that a precisely similar state of matters must also ensue. Now, in a certain stage of kidney degeneration, and in certain stages of heart disease, there is an increase of pressure in the hepatic artery, and, as the former of these complaints is one common in advanced life, we often come across permanent glucosuria (*i. e.*, diabetes) in elderly people. The amount of disturbance is, however, never great, nor does, as a rule, the health suffer from the pres-

ence of this derangement. But, as a result of worry, mental overwork, of a blow on the head, or of sunstroke, the brain may, in one part, undergo degenerative changes, and if the part thus affected be that whence the nerves which control the hepatic circulation in the liver issue, there will be a permanent and gross over-supply of hepatic blood, and permanent glucosuria (*i. e.*, **Organic Diabetes**) of a generally intractable kind will be established. This derangement may occur at any age, and is the only form of glucosuria that need be dreaded.

But what must be the consequences of much free grape-sugar in the general circulation? The sugar will rob the blood of much of its water and travel out by the kidney, carrying that element away, hence **Glucosuria** induces *thirst, dryness of the skin and of the mouth, dryness of the lining membrane of the bowel, or constipation and the passing of large quantities of sugar-laden water. Insatiable hunger* is a further symptom, for within a short time of each meal the glycogen store is exhausted, and the body demands more fuel.

A host of secondary symptoms may follow : *coldness of the extremities, double soft cataract, great debility, loss of flesh, muscular weakness, rheumatic pains, sponginess of the gums,* a *chloroform-like smell of the breath,* etc. Not unfrequently, as in gout and biliousness, nervous disorders become prominent in the course of glucosuria, and many derangements *simulating, often closely, locomotor ataxia, epilepsy, apoplexy,* etc., may manifest themselves and excite unnecessary alarm.

It must, however, be distinctly understood that none of the symptoms I have enumerated exist, to an extensive or alarming degree, in ordinary glucosuria, the result of mere overfeeding or of temporary over-pressure in the hepatic artery, but are only the consequences of perma-

nent glucosuria (*i. e.*, organic diabetes), taking its origin in brain degeneration.

The appearance of sugar in the urine of those who consume large quantities of sugar or starch is a distinct benefit; the kidney, acting as a safety-valve, ridding the body of such excess. In gouty and bilious people glucosuria is commonly witnessed even in the absence of any noticeable excess, and means only that the liver's functions generally are impaired.*

In every ten cases of so-called diabetes that have presented themselves to me, nine have been sufferers from a temporary, and under the circumstances beneficial, glucosuria, and their worst symptoms the consequences either of unwarranted fear or of absurd dietetic restrictions, not only unnecessary in their cases, but positively harmful. †

The sole treatment for glucosuria, when it is not associated with brain disease (and this latter form of the complaint does not here concern us), is to cut down somewhat the supply of starch and sugar. Never, in these cases, should we forbid entirely starch and sugar and recommend only diabetic food; it is absolutely unnecessary, and, in almost every case, most dangerous; not one constitution in twenty can stand such a sudden and radical dietetic change. It is entirely fallacious to argue that because the Esquimaux and the Guachos can maintain on meat and

* The permanent form of glucosuria due to nerve degeneration is nearly always accompanied by the passage from the kidney of an excess of urea.

† It is an extraordinary fact that there exist even young people who pass regularly large quantities of urine containing much grape-sugar, and who, nevertheless, remain in perfect health. I know at present of one gentleman, under thirty years of age, who has been over and over again rejected by insurance societies on this score, and who yet, after five or six years, during which I have known him, remains in absolute health.

fat, to the exclusion of starch and sugar, necessary health and vigor, that therefore the Englishman cannot at any rate be much injured by such a dietary, for both of the two former races have become very *gradually* accustomed to their mode of life.

5. *The Liver acts as an excretory organ.*—This function and its derangement will demand but a few lines. The liver excretes, mixed with the ordinary bile constituents (the bile acid, bile pigment, etc.), several materials brought to it by the hepatic artery. Of these the one that is most important in relation to disease is cholesterin. This substance, ranged by chemists among the alcohols, is a product of nerve waste, and is carried by the branches of the hepatic artery to the liver for excretion with the bile. When, as a sequence of any of the causes given under the head of biliousness as producers of an arrested bile flow, the bile stagnates, there is always grave risk of the formation in the small ducts of bile-sand, some of which, carried on subsequently into the gall-bladder, forms the nuclei there of larger concretions which receive the name of **Gall Stones.** The genesis of a gall stone is the same as that of a gouty stone in the kidney, but the constitution of each is very different, the former consisting of cholesterin, earthy salts, biliary and fatty acids, etc.; the latter of uric acid or of urates.

The gall-bladder, unfortunately, like the urinary bladder into which a uric-acid stone generally finds its way from the kidney, forms a convenient resting-place for a gall stone, and one from which it is difficult to dislodge it by any short of surgical means. It may, however, as a result of some sudden effort on the part of the patient, or even without this, enter the large bile duct and be forced onward, by the spasm it therein sets up, to the bowel. This process may last for minutes or for days, and be at-

tended by jaundice or not so attended. It usually gives rise to the most sudden and excruciating pain, but many stones, even of fair size, may thus be passed with nothing but trivial discomfort, or even without any such sensation at all. It is no unfrequent thing for pathologists to find several of such stones, lying loose in the intestines of persons who never complained of a single symptom, even remotely referable to their presence in, or their passage along, the bile duct.

The treatment of **Gall Stones** is the same as that for chronic biliousness, of which indeed it ranks but as a symptom. The dietary should consist largely of fruit and vegetables, and of water and other bland fluids. Every means conducing to the general health of the body should be studiously pursued.

A visit to the waters of Carlsbad, Vichy, and Ems is often of service, more perhaps as leading to the consumption of large quantities of saline fluid (and both salt and water are to be reckoned as bile diluents) than for any special virtue resident in the waters.

The salicylates, owing to their action as potent bile stimulants and their power of increasing especially the watery constituents of bile, have been recommended, and their use is indicated in cases where the presence of bile-sand or bile-gravel in the smaller bile ducts is reasonably to be suspected, but their power over the liver, like that of all stimulants, is soon lost and replaced by an after and counter effect—*i. e.*, a reaction; and this drawback, in addition to the irritating properties of these compounds on the kidneys, renders their prolonged use injudicious, and, in the long run, usually anything but a blessing.

Ere we proceed, one or two points will require some elucidation. I have said that **Gout, Biliousness, Rheumatism, Glucosuria,** and **Gall Stone** are derangements often

due to simple over-feeding, to the consumption of food in excess of the digestive faculties. How then comes it, may ask the reader, that these complaints occur, as a rule, singly, and that a combination of them is seldom witnessed in the one man, whatever be his dietetic mistakes? The answer is simple. That function of the liver, which, by reason of the influence of heredity, or the stress of circumstances special to the case, is the first to break down, brings in its train symptoms which compel the patient, temporarily at all events, to exercise great frugality. How is the dyspeptic, for dyspepsia is but one of the many secondary signs of gout, etc., to be a glutton? The very difficulty of digestion, be it remarked, is here seen in its true aspect, that of a benefit, saving the sufferer from further evil, and even from death. Nevertheless, all the failures of the liver may be seen, though not often simultaneously, in the one sufferer. Up to middle life biliousness will probably be the sole manifestation of derangement, and this may be accompanied by the formation of gall stones. In middle life gout will take up the running, arresting or lessening, by the restrictions it imposes on the food, the course of the complaint which preceded it. Glucosuria may appear a little later, for it is a frequent accompaniment of gout, and rheumatism, or what would pass as rheumatism in a non-gouty subject, will almost, for a certainty, be soon added to the list of complaints. Towards the end of life Bright's disease of the kidney will not improbably establish itself, and with it, some authorities think consequently on it, degeneration of the arteries and valvular disease of the heart will put in an appearance, which conditions render the glucosuria, at first intermittent and slight, permanent and troublesome. Such is the simple sequence of misfortunes, all derived from the one source, liver failure, which go to make

up "the complication of diseases" from which a patient declares himself to be suffering, nor is it to be wondered at that the sufferer should be perplexed at the multiplicity of his troubles, when we remember that each degeneration again induces a secondary set of further derangements in the eyes, the ears, the bladder, the skin—in fact, all over the frame.

Passing now from our contemplation of the results of excess as witnessed in the liver, that great janitor placed at the portals of the circulation, let us briefly discuss the consequences of excess as they appear in the blood-stream and in the cells to which it is borne.

As regards albumen, an excess in this, the only real cell-food, means, as I have already said—for we have had to pursue the consequences of gout and of rheumatism beyond their fount, the liver—a slow degeneration of the kidneys, arteries, and heart. In fact, the one word *degeneration* covers the very long and formidable list of derangements which "as the night the day" must follow in the wake of an over-supply of albumen. Each cell in the human body, be it in a solid organ such as the liver, kidney, or brain, or in a hollow one, such as a blood-vessel or other channel, possesses but a certain store of energy, which must, by the processes of life, be eventually exhausted in any case, and which may be either made by economy to suffice for what we call a prolonged and healthy life, or, by over-stimulation or other misuse, be brought to premature failure. The so-called evils of advancing age, which show themselves in some when the meridian of life is, judging by years only, scarcely passed, are not the *necessary* accompaniments of age, but merely the signs and evidences of an ignorant misuse of the body, weak perhaps also from the time of conception, as a result of imperfect parents. If men were bred like domes-

tic animals, with a main view to the duties which each is expected to fulfil in life, and if the elementary laws of physiology were understood and followed, disease, except as the result of mechanical violence, would be almost unknown. The breeding, training, and rearing of the race-horse are entirely different from that of the farm steed, and, as a result, the ends to be secured, in the first case speed, in the second strength, are usually obtained; and if hygiene is ever to command the respect and the gratitude of the human race, it must teach, in regard to man, the same principles, and not the absurd and utterly unscientific "one standard for all" doctrine. What are nine tenths of the derangements for which man seeks relief due to, but to the unwise attempts to accommodate a body, well fitted only for certain conditions to others, to which it evidently is not so fitted, and with which it is ever, as witnessed by its derangements, seeking a *modus vivendi*. Fortunately for mankind, functional disease often steps in between him and his latter end, and prolongs a life which otherwise must be in many cases exceedingly brief.

An excess in the consumption of the fuel-foods—*i. e.*, the fats, starches, and sugars—over and above the combustion power—*i. e.*, the oxygen supply of the body—leads to the one great evil **Obesity**, which again brings in its train many secondary and grave derangements.

The subject of corpulence being in many ways an important and interesting study, we may profitably inspect the subject a little closely. First, as to its causation :

Excessive eating, if the primary digestion remains good, will naturally rank first among causes, nor need this excess be confined to the fuel-foods, for albumen, and perhaps every substance that is capable of being absorbed by the stomach and bowel, except water and such compounds as

are of the nature of inorganic salts, undergo some oxidation in the body and therefore draw on the oxygen supply available for the fuel-foods. Alcohol is a notable member of the latter class, and while itself an indifferent and singularly inconvenient food, it economizes the consumption of fuel-foods, and may, therefore, spite of its many great drawbacks, be sometimes useful as an adjunct in the treatment of wasting complaints. *Alcohol drinking* is, therefore, also a common cause of obesity.

It is clear, moreover, that *any decrease in the necessary oxygen supply* will tend also to the production of corpulence. Want of exercise and habits of indolence become, therefore, other things being equal, decided fatteners. The air of valleys, especially if somewhat moist, will, by its comparative poorness in oxygen, favor the process. *If the red-blood corpuscles of the blood, the oxygen carriers, be deficient in quantity*, a state of matters often seen in anæmia, especially in that form of it common in young people, and which is unconnected with organic disease, there will be observed a remarkable tendency to plumpness, often a very puzzling symptom to the friends of the patient.*

It also stands to reason that if loss of bodily heat by radiation can be minimized, there will be a tendency rather to the deposit of fuel-foods in the body in the form of fat, than to their complete combustion. Flannel clothing worn next the skin, and a warm, moist temperature, are therefore entitled to rank as indirect agents in increasing bodily weight.

The sexual system exercises a potent, though obscure, influence on corpulency. Torpor of it is marked by a dis-

* Drs. Vulpian and Dechambre have proved incontrovertibly that an increase of weight is the result of bleeding in healthy people.

tinct increase of weight, while undue activity is attended by the opposite condition. To this fact is due the tendency to corpulence so often observed in women after the climacteric, and many of the more or less sudden variations in weight in both sexes. Unsexed animals fatten with greater readiness than do others, when placed under similar conditions of life. Finally, *heredity* in this, as in all other complaints, is often a potent predisposing cause.

As to the treatment of obesity, much has been written. I need scarcely caution my readers against each and every system that depends, mainly or solely, upon the administration of a drug, without distinction of persons, for its results. All noxious drugs will decrease the bodily weight of those who are foolish enough to take them systematically, by their interference with the processes of healthy nutrition. Some, of which solution of potass is an example, acting more or less in a local manner, disorder the lining membranes of the stomach and bowels, and thus arrest digestion, though this malign effect, being slow in operation, often escapes the notice of the patient, till he finds himself, perhaps suddenly, the victim of incurable dyspepsia (chronic gastric and intestinal catarrh); other drugs again, of which order are the stronger acids—vinegar, sulphuric acid, etc.—act in a similar way, and, when consumed with or just after a meal, interfere also directly with the digestibility of the food.

A third variety of drug depends mainly for success upon its purgative action; of such many of the purgative saline waters, especially those of Carlsbad, Marienbad, Brides, and Püllna, are good examples. Objectionable as sole agents of cure, they are often admissible as adjuncts in a more extensive and physiological treatment.

My advice to the corpulent is as follows: Go first to a doctor and ascertain if you require treatment, if your state

is one that will be benefited by a reduction in weight. The majority of those demanding treatment are not fit subjects for it. In many, especially in those of the female sex, the increase of weight is only temporary and does not involve, even if permanent, any ultimate danger; on others, again, heredity has set its seal so strongly that no means, short of those dangerous to life, would have any chance of success. The decision in every case must rest with the physician, and to him also must, in nearly every instance, the selection of the line of treatment be left. Of such, omitting the very doubtful cures by balneo-therapy, electricity, milk diet, mineral waters, and drugs generally, there are four which deserve attention. They are those of Banting, of Ebstein, of Sée, and of Œrtel-Sweininger.

That of *Banting* may be briefly dismissed. It recommended a relative excess of meat and a deficiency of fruit and vegetables. This mistake often led to severe dyspepsia and always to a considerable, and sometimes to a dangerous, loss of strength. The stomach, moreover, rebelled against the sameness of the dietary.

The system of Ebstein is founded on surer ground. He teaches, with perfect correctness, that an excess, even of albumen, leads to corpulency, and therefore he relies upon a general *all round* reduction, rather than, as did Banting, on a diminution in the fats and starches only. He recommends also, with great wisdom, a gradual, and not a sudden, restriction in food.

Ebstein generally fixes his zero of diet at about $3\frac{1}{4}$ oz. of albumen, $1\frac{1}{2}$ oz. of starch or sugar, and $2\frac{2}{3}$ oz. of fat. He limits, moreover, the choice of fat consumed to butter or lard, which are, among fats, the most easy of digestion. He restricts to the lowest point the drinking of fluids, but allows light white wine as a beverage.

Dr. Germain Sée, while adopting in general the system

of Ebstein, adds gelatinous substances to the regimen, and allows an abundance of fluid (in this particular differing from all his rivals), while forbidding alcoholic drinks, especially banning malt liquor in every form. He recommends coffee and tea in abundance, holding that in large doses their action is to aid denutrition, but that in small doses they possess an opposite effect. He believes in the efficacy of certain drugs, notably of iodide of potassium, especially if the heart be much oppressed by the weight of fat.

The *Œrtel-Sweininger system* is, to my mind, of all the most rational, complete, and safe, as certainly it is the most generally successful, of any. This treatment includes a more thorough preliminary study of each special case than is accorded under any other system. Two great classes, subject to many subdivisions, are recognized by it. The first class comprises those whose hearts have been already affected by the adipose deposit, the second all not thus affected. For the former, cautious and gradually increased exercise, a somewhat liberal allowance of meat, and often a ferruginous tonic, is the line of cure; for the latter, forced exercise — especially mountain-climbing — and a more restricted meat allowance are recommended.

The diet scale is a much more liberal one than that of Ebstein, and, while Drs. Œrtel and Sweininger believe that restrictions in the quantity of fluid consumed have both a sure effect in reducing bodily weight, and a beneficial action in lessening the strain thrown on the fatty heart, their fluid allowance to the patient is, on the whole, much fuller than that of Ebstein, but the ingestion of fluid during a meal is strictly forbidden.

About 5 oz. of albumen, 3 oz. of starch or sugar, and 1½ oz. of fat represent the mean diet under this latter cure, for the carrying out of which Dr. Œrtel keeps a special establishment.

Such is a brief outline of the most reliable systems for the reduction of corpulency, and of the three—for Bantingism is to all intents and purposes dead—the last-mentioned, that which usually passes as Œrtel's, is to be preferred, as founded on the surest principles, and carried out according to the special requirements of each individual case. It is, however, expensive, for it involves residence at Dr. Œrtel's establishment for some weeks, and this at once places it out of the reach of the majority of sufferers.

As to home treatment, if the doctor's opinion be favorable as regards the vigor of the heart, and if the case be one likely to benefit the general health by the reduction of weight, the best way to insure the desired end is as follows :

(*a*) *Gradually reduce the dietary*, but in no case let the daily amount fall below 5 oz. of albuminous food, lean meat or fish, etc., 1½ oz. of fat, chiefly butter, and 4 oz. of sugar or starchy material.

To this may be added per diem from ½ to ¾ lb. of ripe fruit, except grapes, figs, dates, and nuts, and at least ½ lb. of watercress, parsley, celery, cucumber, cabbage, kale, turnips, or asparagus.

(*b*) *Drink sparingly*, and of water, coffee, or tea only, and never within one hour of a meal nor at mealtimes.

(*c*) *Take gradually such exercise as will induce free perspiration*, and deep indraughts of pure air. Lawn-tennis, cricket, football, cycling, and riding are the best forms.

(*d*) *Bathe frequently*, a hot bath twice a week, a Turkish bath once a month, and a cold douche each morning.

(*e*) *Take, if the above means do not suffice*, an occasional dose of Püllna, Carlsbad, Friedrichshall, Vichy, or other purgative mineral water ; or even, if all measures fail, a morning and evening dose of iodide of potassium or of

iodide of sodium in one of the forms to be found in the Appendix (Formulas 2 and 3). They are, at any rate, the least noxious of the long list of medicaments which possess, among other properties, that of reducing weight.

Summary of Chapter.

Let us try to take up, in one *coup d'œil*, all the results of excess we have mentioned, and some less important ones that require but few words.

When the amount of food consumed is in excess of the bodily requirements, there will, of necessity, appear in varying severity and in a variable period—both of which are dependent on the age, strength, and habits of the individual, and the amount, nature, and frequency of the excess—two sets of symptoms.

The first, those of functional disorder, of a corrective and curative nature, and due to the rebound of the body, to use a figurative but expressive simile, from adverse conditions.

The second, those of degeneration, of premature, more or less local, death, due to exhaustion of the vitality resident in the outworked organs.

The evidences of the first set—*i. e.*, of beneficial functional disorders, are :

1. *In the alimentary track:* **Dyspepsia,** with its host of well-known primary phenomena, *loss of appetite, distaste, irregularity of bowels, flatulence,* and *pain.*

2. *Commencing in the liver and thus affecting, through the blood-stream, more or less the whole body:* **Gout, Biliousness, Rheumatism, Glucosuria,** and **Gall Stone.**

3. *Restricted to the tissues:* **Corpulence.**

The secondary, final, degenerative symptoms are as follows :

1. *In the alimentary track.*—As a result of the persist-

ence of the causes which have led to the dyspepsia (*not* as a result of repeated attacks of dyspepsia).

Premature debility, due to structural change, in the whole alimentary track, and marked, *in the mouth*, by permanent changes in the lining membranes and the salivary glands, and hence in the saliva, and in decay of the teeth; *in the stomach*, by permanent alteration in its walls, with a lasting impairment of its digestive fluid, and of its muscular contracting power; *in the intestines*, by changes similar to those in the stomach.

All of which lead to a permanent, all round impairment of the digestive faculty; the sufferer possessing a condition of the digestive organs named proper to a man much more advanced in years.

2. *In the liver.*—A premature and inveterate debility characterizes also the functions of the liver. The poisons of gout, biliousness, rheumatism, and glucosuria are no longer intermittently, but regularly, poured into the blood, and the formation of gall-stones advances. The liver structure itself becomes altered, the cells begin to disappear, strangled by increasing fibrous material.

3. *On the tissues falls also a very heavy strain.* The eliminating organs, the kidneys especially, but also the skin and lungs, are systematically overworked in trying to cope with the ever-increasing quantity of poisonous material in the blood-stream, and therefore, sooner or later, their failure comes.

(*a*) *In the kidney* such failure is known either as contracted kidney, a form of **Bright's Disease** of an incurable kind, or takes the shape of cystic or even suppurative destruction.

(*b*) *In the lung*, **Chronic Bronchitis** and one variety of **Chronic Asthma** are the commonest complaints, but more deeply seated evil may appear, especially a form of change

similar to that seen in the kidney and liver, a growth and subsequent contraction of the fibrous material, leading to a form of *consumption* not unfrequent in the victims of excess, and known as **Fibroid Phthisis.**

(*c*) *In the skin*, **Chronic Eczema** and **Chronic Psoriasis** are the commonest evidences of failure of the skin functions.

But the breakdown of the kidneys from its first commencement, and often years before it can be diagnosed by the aid of science, sets up a train of further symptoms. On them falls naturally the duty of ridding the body of those very poisonous nitrogenous débris, urea and uric acid, which, in health, are always being rapidly eliminated by them. Not only, then, from the first moment of failure, do the poisonous products of mal-digestion and mal-assimilation accumulate, but also the natural, but, if retained, deleterious, products of the normal disintegration of tissue collect in the body, aggravating the existing evils and setting new evils in action. The blood-stream is not only vitiated, but, as elimination fails, the blood-pressure rises, and the overstrained coats of the arteries and the heart itself, begin to undergo retrograde change. Everywhere is disorder; life may flicker on for long, if, under the direction of skilful men who comprehend the whole situation, wise means are adopted to economize what remains of vitality, for a single adverse condition may suffice to extinguish it forever.

What a terrible picture of final disorder, the reader exclaims. There is nothing terrible, and there is certainly nothing disorderly, in such a sequence of events. Each effect is the well-ordered and inevitable result of an adequate cause. The individual started life with a certain capital of vitality, unevenly distributed perhaps, thanks to the folly, vice, or misfortune of his forefathers, among the various organs of his body, and he made no attempt

to study the various dispositions of this vitality. The modes of life of more robust or differently constituted individuals he copied, and his weaker organs gave out, while the stronger ones broke down under the additional strain thus thrown on them, and then, in the words of Edgar Allen Poe, "unmerciful disaster followed fast and followed faster," aggravated probably by misdirected efforts, the result of misinterpreted symptoms. The point of view, the human one, from which we regard the scene, misleads us; how shall we view as beautiful, as dispassionately well ordered, that which robs us of a relation, a friend, or even a fellow-man, and yet the same laws of Nature by which alone what is, is, are here working as regularly, as orderly, as precisely, as in the building up of a race or the blooming of a beautiful flower.

But a truce to sentiment: the practical question of treatment confronts us.

Let each individual early in life study his own body and its special disposition of forces. For this no abstruse details, no higher mathematics, nothing but a simple book on elementary physiology, a little common-sense, and a little study of his family history in its bearing especially on family weaknesses are required.

Thus may each one come to a real physical knowledge of himself, of his wants, of his possibilities, and, finally, of his likely dangers. To be forwarned is to be forearmed.

When, within that kingdom of cells which he rules, man hears the mutterings of discontent, or feels the shock of actual rebellion, let him be wise, let him recognize that he has oppressed, over-taxed, some portion of his people, and let him proceed without loss of time to a redress of grievances and to a permanent and necessary reform of his mode of government. From apparent, disguised evil

will thus come good; from temporary commotion, a more lasting peace.

But even if matters have reached a desperate pass; if, as a result of inheritance or of years of misgovernment, the kingdom is eaten through and through with discontent, is wasted by famine or other disaster, so that no reform, no redress of existing grievances, can now undo the mischief, even then much may be done by management, by care, by knowledge, and by tact.

The dietary cannot be cut down to the low level of digestive power; then let it be cut down as low as it safely can. Apply the pruning-hook of surgery or of medicine where it will suffice to cast off useless and troublesome members, so that the essence of life may be economized for the still useful members of this country of man. But he who is wise in time, he who will order his life wisely and temperately, need not anticipate trouble, for it will probably never touch him. For him the science of medicine will exist as a friend and counsellor, never as an almost impotent ally in the dread struggle for the last remnant of a miserable life.

The physician does not carry with him any essence of life that he can give away to the prodigal, bankrupt in vitality, nor do any of his drugs possess one conceivable fraction thereof; he carries with him but one gift that he can impart to the sufferer, knowledge of human structure and human powers, with which charts of the calmer, safer waters of life may be constructed.

CHAPTER IX.

DISEASES DUE TO UNSUITABLE FOOD.

I. *Foods absolutely unfit for all men.*

The flesh of animals that have given lodgment to such parasites as tape-worm and trichina, or that have died of certain febrile diseases, or that have been dosed with such drugs as arsenic and antimony.

Decomposing meat.

Meal made from blighted wheat, barley, or rye, or that in the process of grinding has become contaminated by lead, etc.

Water containing certain soluble salts, especially oxide of lead, or that contaminated by decomposing animal products.

II. *Foods unfit for some men.*

Unfit for all whose digestive powers, by reason of latent gout, chronic biliousness, general debility, or other cause, are defective.

- Fat when hot, or when mixed with condiments, etc., as in ragouts.
- Fat (*e. g.*, butter or lard) intimately compounded with flour and sugar, as in pastry, sweet cakes, etc.
- Fat becoming at all rancid.
- Imperfectly cooked starch, as in boiled potatoes, in some pastry, etc.
- Uncooked vegetables, as a rule.
- Sugar in large quantities.
- Sweet wines.
- Tea, under some conditions.

III. The questions of alcohol, vegetarianism, low diet, milk diet, and grape diet discussed.

CHAPTER IX.

DISEASES DUE TO FOOD.

(C) TO UNSUITABLE FOOD.

Of diseases due to improper foods there are two great classes, the first comprising articles of diet which contain animal or vegetable substances more or less deleterious to mankind in general; the second including certain compound or even certain simple foods, which, in some individuals and under some conditions only, may set up signs of disorder. The first class is therefore that of foods *absolutely* improper, the second that of foods *relatively* improper.

I. *Foods absolutely Unfit for Man.*

Solid foods, absolutely improper.—Food, using the word in its broadest sense to include all combinations of nutritive material commonly employed and popularly recognized as food, may be harmful to man by reason of its containing certain chemical products, the result of decomposition, certain foreign matters of the nature of adulterations, or certain animal or vegetable parasites capable of entering into and disturbing the body of man.

Flesh food may become dangerous by reason of its con-

taining certain parasites. The flesh of the pig, of the bullock, of the cow, and of the calf may be infested with various members of the tape-worm family, in that stage of development in which they are called cysticerci; which immature forms, when consumed by man, can complete their life-history within his body, there arriving at the mature **tape-worm.** Smoking and salting lessen the danger from the consumption of flesh thus tainted, while *thorough* cooking renders it absolutely safe.

A second parasite, the **Trichina spiralis,** is found only in the meat of the pig, nor does smoking, freezing, salting, nor even decomposition, serve as efficient protection to the consumer thereof, while even thorough cooking may fail to destroy the parasite. The disease resulting in man from such meat goes by the name of **Trichinosis,** and bears a strong likeness in its general symptoms to typhoid fever, for which it has been often mistaken.

With regard to the non-parasitic diseases that affect animals used as human food, Professor Gamgee, in his fifth report to the Privy Council, gives it as his opinion that one fifth of the total quantity of flesh meat consumed is derived from animals suffering from some malignant disorder, and thus proves that the risks supposed to be attendant on the consumption of such food have been overestimated. Direct evidence points in the same direction, for Parent-Duchâtelet quotes ("Hygiène Publique," vol. ii., p. 194) two instances in which 300 horses, suffering from that malignant disorder called glanders, were eaten without injury to the consumers; and the experience of observers in 1870, during the siege of Paris, is a further powerful proof of the immunity with which flesh, thus dressed, may, as a rule, be partaken of.

On the other hand, quite recently, Dr. Woodhead of Edinburgh, in an elaborate paper, supported, by theory

and demonstration, the view that tubercular disease existing in cattle may be communicated to the consumer, but his evidence, carefully weighed with the fact that tubercular disease is exceedingly frequent in cattle, tends but to the general conclusion drawn from all the combined sources of observation, that, while it is *injudicious* to eat the flesh of animals dying of any severe disorder which alters radically the constitution of their blood and of their tissues, it cannot with truth be said that such a course is attended by very grave risk.

The opponents of meat-eating, who always insist on the dangers attendant on the consumption of animal food, have a stronger case where the eating of decomposing meat comes in question. Numerous and excellent foreign observers, such as Schmiedeberg, Brieger, Zuelzer, Koppe, and V. Anrep, have obtained from flesh, in a state of putrefaction, substances that are allied in action to the most deadly of the known vegetable alkaloids, while hundreds of medical men, in all countries, can cite cases of acute disorder in which the connection between illness and the ingestion of food—generally of swine flesh or of fish—that had undergone putrefactive change, is clear. Even here, however, it seems necessary to the production of poisonous symptoms that decomposition should have far advanced, a state of matters that can only, when the meat is mixed with other ingredients and highly seasoned, as in sausages, escape the observation of the consumer.

But it would be wrong to conclude that even putrid meat is always, or even frequently, poisonous. According to Wilkes,* as quoted by Dr. Pavy : "The American Indians all prefer their meat putrid. Parts of the salmon they bury underground for two or three months to putrefy,

* "U. S. Exploring Expedition," vol. iv., p. 452.

and the more it is decayed the greater delicacy they consider it." Simmonds, in his "Curiosities of Food," also says: "The flesh (of the seal) half frozen, half putrid, in which state the Greenlanders term it mikiak, is eaten with the keenest appetite."

In these cases, and in similar ones that might be quoted, there exists, no doubt, the strongly protective influence of habit gradually acquired, but even after every allowance has been made for this, there will yet remain, in the minds of the impartial, grave doubts as to the accuracy of the views of modern hobbyists who threaten with the most awful consequences the careless consumer of meats more than doubtfully fresh.

Apart altogether from their relative indigestibility, and the direct consequences thereof—namely, colic, vomiting, and nettle-rash—shell-fish, especially mussels, are apt occasionally to produce symptoms of severe blood contamination in the consumers; coma, paralysis, convulsions, and even death having not unfrequently followed their use. It has been recently proved that these symptoms, which are identical with those that characterize the occasional **poisoning by putrid meat,** are due to an identical class of poison, called in both cases a **ptomaine,** which would seem to exist as a *normal* constituent in the bodies of certain varieties of the mussel family.

Finally, flesh food may become poisonous from the administration during life to the cattle of various medicines, especially of arsenic and of antimony; or from the fact that the cattle have grazed on land on which noxious herbs flourish. Evil consequences to man from either of the latter causes are, in this country, exceedingly rare.

From decomposing eggs, milk, and cheese, it is also claimed that various substances exerting a poisonous influence on man have been obtained.

Fats afford no breeding-place for parasites, nor does their decomposition result in any known active blood poison. The rancidity of fat, the result of bad preservation and other conditions, and which often occurs spontaneously in the stomach of the dyspeptic, is due to a partial conversion of the fat into fatty acids (butyric, valerianic, etc.). These are capable of irritating severely the coatings of the stomach and intestine, and of thus producing pain, vomiting, and diarrhœa, but not of producing any disorder of the blood.

Starches and sugars, and the food compounds into which they usually enter, become rarely a source of danger. Flour, and therefore also bread, are the two materials in which adulteration is most practised. Alum, the addition of which is now forbidden by law, was formerly a very common, and is, even now, an occasional ingredient in the staff of life. Its effects consist of the ordinary symptoms of dyspepsia, but cannot be spoken of as absolutely poisonous. Lead has been found in bread, and, as its origin in the following case of poisoning is instructive, and the symptoms which it sets up are always grave and usually insidious in their advance, it may be well to refer to it. It occurred at Taunton, and was reported in the *Sanitary Record*, May 25, 1877, by Dr. Alford of that city. From fifteen to twenty persons suffered. After prolonged inquiry the origin of the lead was traced to the bread, and thence to a certain flour-mill, where it was found that crevices in the millstones had been filled with lead, while on further investigation it came out that there existed a widespread custom of mending such spaces by filling them with red-lead and borax, or with alum and borax.

Flint, the carbonates of lime and of magnesium, clay, and gypsum are among the less important and least frequent adulterations of flour, and do not give rise, unless present in large quantities, to much derangement.

Rye, but also occasionally wheat and barley, may be attacked by a fungus called **Ergot,** which grows in such a way on the grains as to represent a spur. Flour made from grain thus diseased has rarely been found in this country, and, spite of the confident statements of some observers, it is open to question whether the consumption of ergotized flour is really fraught with as much risk as has been represented by English writers who have had but little opportunity of practically studying the question. This only is certain, that at times, when the blight has been *unusually* severe, the inhabitants of wide districts in the south of Europe have suffered from gangrenous and convulsive disorders, while at other times they have consumed, for prolonged periods, and in small amounts, this fungus without becoming the victims of either form of disease. It is probable that habit may here, as everywhere else, produce a tolerance which may account for the divergent views of different authorities.*

But we must pause here to devote a few lines to treatment.

Tape-worm.—The preventive treatment of tape-worm consists in the consumption only of beef, veal, and pig's flesh that have undergone a thorough process of cooking.

The indications of the presence of this parasite are somewhat obscure, and vary widely in different persons. Vague signs of indigestion, accompanied by frequent pain of a twisting character in the region of the navel, are common, but not characteristic symptoms. In some few cases the irritation set up by this uninvited guest may, by reflex influence, produce disorder of an alarming nature. I have

* Professor Hamilton, of Edinburgh ("Practical Observations on Midwifery," vol. ii., p. 87, 1836), speaks of ergoted rye bread having been eaten from time immemorial by peasants in certain parts of France, with perfect impunity.

on several occasions seen **Epilepsy** and even **Chorea (St. Vitus's Dance)** thus take their origin. **Nervous Depression,** obstinate **Vertigo, Cough, Aching in the Limbs, Palpitation of the Heart,** and **Disturbances of the Special Senses** are other, and even more rare, so-called "reflex" (*i. e.*, reflected) nerve disorders set up by this parasite.

The treatment of tape-worm is simple but not always satisfactory. Oil of male fern and turpentine are the two most effectual remedies. Suitable formulæ for their employment will be found in the Appendix.

The Trichina spiralis, which produces in man the disease known as **Trichinosis,** occurs only in the flesh of the pig. Thorough cooking is the best preventive of the disorder.

The symptoms of **Trichinosis** are closely similar to those of **Typhoid Fever,** but the former disease is generally attended by most severe muscular pain and often by puffiness of parts of the body, and especially of the face—symptoms that are always rare, and never prominent, in typhoid fever. The duration of the acute stage of trichinosis often extends to two months, that of typhoid to rarely longer than four weeks; the convalescence from the former complaint is slow, intermittent, unsatisfactory, and often very incomplete; that from typhoid, except in rare instances, while also slow, is steady and complete.

The treatment consists simply in procuring rest and quiet in a warm room for the invalid, and the administration of foods suited to the digestive capacity. In the early stages Nature herself seeks, by vomiting and diarrhœa, to throw out the parasite, and these symptoms may be judiciously encouraged by the administration of small doses of some simple purgative. No known medicine has any power to dispossess the trichinæ that have once obtained lodgment in the muscular tissues.

Poisoning from Ptomaines.—When, as an apparently direct result of the consumption of questionable meat or fish, or of even fresh mussels, vomiting, colicky pains, diarrhœa, signs of paralysis, defective vision, giddiness, failure of the heart, coldness and clamminess of the skin, and a tendency to profound somnolency appear, prompt measures to evacuate the stomach by the aid of an emetic, and the bowel by the aid of a purgative, must be taken. The patient should be encouraged to lie down, his agitation should be soothed, hot bran bags or poultices applied over the stomach, and a rapid stimulant be administered (hot, fresh coffee, without milk, or hot brandy and water, are usually the best and most handy). These measures will suffice till the arrival of the doctor. It is worthy of remark, and I mention it only as a curiosity, that atropine, an alkaloid prepared from belladonna, and whose effects are a close counterpart of those seen in ptomaine poisoning, seems to be the drug most potent in its power of relieving the symptoms, for which purpose it is recommended by Dr. Lauder Brunton.*

Improper Liquid Foods.

Fluids commonly in use as beverages may become, by chance or design, so contaminated by dangerous material as to come under the heading of food absolutely and in all cases improper.

Water.—No substance appears to possess such a charm for the hygienist, professional or amateur, as water, and certainly none has been the subject of so much cant and humbug. Let us therefore try and clear the ground a little ere we come to consider its real and dangerous, albeit rare, contaminations. An adult man excretes, by the lungs, skin, and kidneys, about 5 lbs. of water per diem, which

* "Disorders of Digestion," p. 284.

amount has, perforce, for the maintenance of the balance of health, to be each day replaced. It is, however, by no means necessary to drink daily to that extent of water, for, in the first place, even our so-called "solid" foods, such as meat, fish, bread, potatoes, etc., consist of more than half their weight of water, while in nearly all fruits and vegetables the percentage of this fluid present varies from 80 to 97 per cent.; while in the second place, the changes undergone by fuel-foods in the body—and even to a slight extent by the tissue-foods—result, as we know, in the production of water and carbonic acid. By the operation of these and many other modifying causes, the physiological requirements of the body are, of course, very considerably, and in different people very variously, affected.

But passing from the question of quantity, for which the only recognized, and the rarely failing guide is the bodily demand, as indicated by the thirst, to that of quality, we have to ask ourselves the practical question—What materials may, under the ordinary conditions of life, find an entrance into the water supply and render that fluid absolutely and unquestionably deleterious? And the answer is, that lead, certain earthy salts, and the germs of some diseases constitute practically the only real poisons.

Water contaminated by Oxide of Lead.—The oxygen in water may act under certain conditions on metallic lead, forming a highly poisonous salt, all the more dangerous inasmuch as its presence is not indicated by any discoloration of, or any smell imparted to, the fluid. If, however, the water contain an abundance of earthy sulphates, an insoluble, and therefore protective, film of sulphate of lead is almost immediately formed on the surface of the metal, effectually shielding the fluid from dangerous contact. Phosphates act in the same manner, but the carbonates are not to be relied on, for the incrustation of carbonate

of lead formed by them is apt to be redissolved by any excess of carbonic acid accidentally present in the water.

The dangers of **lead poisoning** from the consumption of any of the drinking-waters supplied in our larger towns is, thanks to the measures taken to insure a safe and good quality, exceedingly remote. The only precautions I need urge on town-dwellers have reference to distilled and purified, aërated, waters, which, lacking the above-mentioned protective salts, may, by contact with the fittings or taps of the receptacles in which they are stored, dissolve out considerable quantities of the dangerous metal. The same remarks apply to rain-water, or to water from any source which has not been certified as safe by a competent authority. These, if used as beverages, should not pass along leaden pipes nor be kept in leaden cisterns.

The detection of lead in water is within the capacity of any chemist, but a reliable verdict on the safety of any given specimen of water is obtainable only from those who possess certain necessary appliances and some considerable skill and experience on this special subject.

The signs of **lead poisoning** are sufficiently characteristic to offer no difficulty in diagnosis. Though exceedingly insidious at first, the symptoms, which occur generally in the following order, are so steadily progressive and so inconvenient as, with rare exceptions, to insure attention before any very grave mischief is done : **Constipation,** scanty and dark stools, and highly colored urine ; **Severe Colic,** marked by twisting and grinding pains of great severity in the region of the navel ; the formation of a **Blue Line** where the gums and teeth meet ; weakness and trembling, followed by actual **Palsy** of the muscles of the arm, commencing usually in the hand and wrist, and causing the well-known and characteristic "**Wrist-drop;**" and a sallow appearance of the skin—such is the common

sequence of phenomena due to the absorption of lead into the system. Sometimes, however, *constipation*, *muscular debility*, and *flying pains* of a rheumatic or gouty appearance, *severe headache*, and *irregular action of the heart* are the only predominant symptoms. Finally, where the amount of lead present has been large, all the signs of poisoning, which usually occupy weeks or months, may be developed in a few days, or even hours. *Vomiting*, *a quick*, *weak pulse*, *cramp in the muscles*, *especially in those of the legs*, *stupor*, *giddiness*, and *coma* are then the most striking proofs of the existence of this poison.

Can, then, the presence of lead in water be said with absolute correctness to be always and in all proportions deleterious? No; the wonderful powers of accommodation possessed by the body of man, the outcome of many thousands of years of exposure to countless variations in his surroundings, enable it, within certain limits, to tolerate, without disorder, in its daily food supply, a small proportion of this metal, absolutely foreign as it is to its constitution. Thus we find that although practically in every water that has been conveyed along leaden pipes there is always found a trace of lead, yet that unless the amount rise above $\frac{1}{50}$ of a grain of this metal to the gallon, no noticeable consequences ensue from its consumption.

The treatment of poisoning by lead, whatever be its source, consists in the observation of the following simple rules: (*a*) Stop the source of the lead supply;* (*b*) convert any oxide of lead that may be lying in the stomach or intestines to an insoluble sulphate by taking a preparation of sulphate of magnesium (Epsom salts) or sulphate of sodium (Glauber's salt); (*c*) give thrice daily, and in

* This of course is to be obtained by cutting off the contaminated water-supply, but it is worthy of note that the filtration of water through *spongy iron* will remove lead.

combination with iron if great sallowness be present, a five-grain dose of iodide of sodium (*vide* recipe in Appendix, Formula No. 5), which will form with the lead in the tissues an insoluble iodide of lead. In bad cases this medication may be kept up for as long as six months.

Water unfit for Use by reason of the great preponderance therein of certain Salts.

It is by no means as yet certain that an excess of any inorganic salt in water can give rise to disorder. Two diseases have, however, from time immemorial, been associated in the medical mind with a consumption of waters rich in lime salts — to wit, **Phosphatic Stone** and **Goitre.** With regard to the former, Professor Gamgee has stated that sheep are particularly affected by phosphate of lime calculi in the limestone districts, while the excess of cases of phosphatic stone in the county of Norfolk has been, till quite recently, always ascribed to the drinking of water rich in the carbonate of lime. Dr. Wang, however, in his Chinese Customs Report of 1870, pointed out that at Canton, while phosphatic stone was an exceedingly common complaint, it was clearly not in any way associated with the presence of carbonate of lime in the drinking-water, since the Chinese there always drank boiled water. Dr. Richardson has also from time to time brought forth evidence adverse to the popular view of the causation of stone in the Norfolk district.*

The real solution of the mystery is probably as follows:

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* The reader must not confound the phosphatic stones here mentioned (the soft, white, smooth phosphate of lime calculi, and the rough, hard, irritating oxalate of lime calculi) with the uric acid stones and gravel of gout. All varieties of stone, however, produce the same symptoms, and probably, *vide supra*, are more closely allied in their causation than is commonly thought.

Derangements of the digestive apparatus lead to the formation of *every* variety of stone, and such derangements are usually *favored* by certain hard waters containing carbonate of lime (*i. e.*, chalk or limestone) in large amount.

There is, moreover, a distinct connection between nervous exhaustion and the formation of phosphatic calculi that is quite independent of any peculiarity in the water-supply.

As to the treatment of phosphatic stone, it cannot be justly claimed for medicine that it has achieved any triumphs, spite of the pretensions of innumerable quacks, in the cure of this disorder, when once it has become established. The formation of a stone may be prevented, or its increase when once formed be kept down, by attention to the digestive organs, and by the consumption of large quantities of boiled or distilled water ; while the pain it produces, if its shape be irregular, as it will be if its consistence be mainly or wholly oxalate of lime, may be lessened, at the cost of an increase in size and weight, by the steady administration of lime-water, which promotes directly a deposition of the phosphate of lime on the calculus, thus rounding off the irregularities of surface while increasing its total bulk.

The dependence of **Endemic Goitre,** or of **Cretinism,** a form of endemic idiocy combined with goitre, on peculiarities in the water supply, is no better established than is the case of the phosphate of lime stones just discussed, nor indeed are the various authorities who have written extensively on the subject in accord among themselves as to the special salt that is harmful, the one affirming it to be carbonate of lime, a second, with equal confidence, sulphide of iron, while a third denounces the magnesium salts.

The only conclusion that can be drawn from a study of all the authorities is that, as in the case of stone, a water

somewhat unsuitable to the bodily wants will predispose to the formation of goitre and cretinism, but is powerless alone to produce either of them.

Water unfit for Use by reason of contamination with certain forms of Organic Matter, living or dead.

Animal organic matter, in particular *recent* fæcal matter, and in some cases even vegetable organic matter, especially that from marshes, may constitute noxious ingredients when present in drinking-water.

That many diseases travel from one individual, or from one town, to another, by the agency of fluids, and especially of water, has long been absolutely certain, but why at one time, or under one set of conditions, organic material should, when present in such fluids, set up disorder and not at another, and why at one time of the year such disorder should take the form of cholera or typhoid, and at another that only of some very trivial loss of health, were questions which for long defied explanation. It is only within the last twenty years that the following facts, of which I present a short summary, have been established, and that light has thus been thrown on the causation of a vast number of epidemic and endemic derangements.

All air, as well that in the atmosphere as that in water, contains numberless fungi, parasitic plants of extreme smallness, which settle on and propagate themselves in dead or feeble organic matter, therein setting up the fermentative changes which we know as putrefaction.

These parasites, popularly called "germs," scientifically bacteria or bacilli, play thus a very useful *rôle* in Nature by restoring devitalized organic matter once more to the inorganic world.

When the body of man is in a condition of health, and the germs are of the kind and order to which it is accus-

tomed—for millions of them are swallowed at every meal and inhaled in every act of inspiration—these parasitic fungi are, like every other ordinary and common force in his environment, of use in the maintenance of his health and life.

But when—

(*a*) *The human body is weak*, any of the *ordinary* forces in its environment—such as a mere current of air, a fall of temperature, a commonplace article of food—will, by their being in excess of the counteracting, the balancing, power of the body, become a source of danger and set up disorder. Under such conditions these parasites, also useful and necessary as they are to the life and continuance of health of man, may become agents of disease.

(*b*) *Or, the germ*, by reason of the effect on it of unusual circumstances, such as heat and moisture or other conditions specially favorable to its development, may become, by virtue of such development, a new and therefore an unbalanceable* force in the environment of man, and then also the equilibrium of the body of man will temporarily or permanently, according to the nature of such germ, be overthrown.

Of course, if both conditions be present—*i. e.*, if the human body be both weak and the germ be of unusual kind—then will not only the health be sooner and more easily, but almost more completely, upset.

By the light of the above brief summary, all the riddles of epidemic and endemic disease and many other blood derangements may be read.

But we have yet to ask—What are the conditions un-

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* Only *at first* unbalanceable, for if frequently present, the bodies exposed to it become acclimatized thereto. Thus the germs of ague attack the new-comer to a marshy district, while the descendants of those who have for generations inhabited the region enjoy an almost complete exemption, and so with all other fevers.

der which, as far as is known, an ordinary innocuous bacterium may develop into a form which, by reason of its novelty, *and not of any special intrinsic force*, may constitute a danger?

1. The absence, or comparative absence, of oxygen is one. If you suddenly change the environment of a parasitic fungus, you change also, and in necessary proportion thereto, its very constitution and its functions, although its identity remains. It is remarkable under what extraordinarily opposite conditions most of the lower forms of life can exist. Take the parasitic yeast plant and ringworm plant as examples. They can both live without oxygen or with oxygen, but their functions, even their very modes of reproduction, change according to the presence or absence of that gas.

2. The presence of an abundance of organic matter is another condition which, as we can readily understand, is highly favorable to bacterial development.

N. B.—Taking the two last conditions together, let us consider how often disease springs from the combination. The germs of typhus (the old jail fever) are developed when human beings are crowded together in an atmosphere the oxygen of which is exhausted. The living germ of fever is not *produced* by such a combination of circumstances; it is simply *developed*. For this reason the atmosphere of a hospital is favorable to erysipelas and wound-fever (pyæmia), and the statistics of second-rate men, operating under apparently great disadvantage in country districts, are often better than those of the best operating hospital surgeons of our large towns.

3. Heat has a well-known and powerful effect on development in the lowlier forms of life. It is in the hot season in India that, other conditions being favorable, the cholera-germ puts in an appearance; it is during the hot

months of July and August that English cholera-germs spread death broadcast among the children of that land, especially among those who reside in certain — usually damp—localities ; it is after a hot summer that typhoid fever is most common.

But, while a high temperature favors the development of these forms of parasitic life, or awakes them to life after a long period of suspended animation, a low temperature does not always suffice to exterminate them, though it seems to have the effect generally of lessening their functional activity. All the conditions necessary to the production of the germ of Asiatic cholera do not exist in Europe, and when the scourge reaches that continent it has been always reared abroad, but it can live and even, for a time, propagate itself under European conditions. Its activity, however, always lessens with the fall of the thermometer, the germ seeming to become dormant in a low temperature and often to be killed by extreme cold.

4. Moisture generally exerts an influence, especially when in combination with heat, that is favorable to germ development.

So much for the genesis of "germs" that can derange the human body. Once developed, can they travel beyond the area in which they are bred? Yes, if favorable circumstances be present.

As a matter of fact we know that such germs may travel in the air simply, may lie hid among clothes—the cholera is said more than once to have reached this country by means of imported rags—or in food. Finally, they may travel long distances in fluids.

This last mode of transit alone concerns us at present.

Water is the commonest medium of communication, but milk, or any other non-alcoholic medium, may apparently serve as a vehicle.

Among well-known disorders that select water as their medium, *typhoid fever* and *cholera* may be noted. The germ of either disorder once conveyed to running water may carry the epidemic over the country ; indeed, in most cases there may be traced a direct contamination of the water by the excretions of sufferers. A vast quantity of sewage no doubt does, actually must, find its way into the water-supply of every city, especially if the source of supply be a lake or river. This, if dissolved in the water and not excessive in amount, has no appreciable effect on the health of the consumers, and it is only when an epidemic of *Asiatic cholera* reaches our shores and we find, while the disease is rarely or never communicated by the air, it follows very markedly the course of the large rivers, that we begin to suspect that the fluid which we have consumed for so long, while under ordinary conditions perfectly wholesome, was not so absolutely pure as we had fondly imagined. Nearly all the great Indian authorities consider contaminated water as almost the sole means of cholera transit, and they nearly all agree that the disease is rarely or never conveyed by the breath of the patient nor by the air that has passed over his body.

The same remarks apply—with some slight differences, for each germ has its own conditions of life—to typhoid fever, which, by the almost unanimous opinion of English medical authorities, is viewed as communicable by water, milk, or other fluids, but not otherwise contagious.

Milk, like water, is a good carrier of germs, and especially of those of scarlet fever and of diphtheria.

Habit confers a certain immunity, even in the cases of the most malignant germs. It is no uncommon thing for a traveller to be smitten by typhoid as a consequence of drinking but one draught of a contaminated water which the inhabitants of the district can consume without risk of

any kind, while the same may be said in a lesser degree of the malignant cholera-germ.

But what about those terrible-looking forms of life shown to us in a "single drop of London water," of which such wise commercial use is made by the supporters of the "pure water" firms? They are absolutely harmless. No case has been made out against them. On this point Mr. Blyth says: "Confervoid growths, algæ, and desmids are met with in running streams of great purity, and if these are the only structures met with, a water should not be condemned;" while the eminent hygienist, Dr. Parkes ("Practical Hygiene," 7th edit., page and plate 671), says: "The presence of infusoria and animals of low type indicates the presence of organic matter, and it is therefore important to note their presence; but it has not at present been shown that they are in themselves at all hurtful;" while on p. 58, while expressing some scepticism as to reported cases of illness, depending solely upon dissolved organic matter, he implicitly says: "Secondly, organic matter, even to the amount of 14 to 21 parts per 100,000, may exist without bad effects, if it be perfectly dissolved. In the latter cases, however, the water is always clear and sparkling and never tainted or discolored."

We may conclude, then, that while bacteria exist everywhere, in water as in air, they are capable of developing into actual germs of disease only under exceptional circumstances, but that when once formed they will continue, as long as circumstances are in their favor, to propagate themselves, and that, according to the conditions necessary to their existence, some can exist for long and can propagate their kind in water or in milk, while others can subsist, and therefore can travel, only in the air. Germs are furthermore to be carefully distinguished from the infinitely larger animalculæ which are found in nearly all

water, and which, though their presence may occasionally give rise to the suspicion of more organic matter in that fluid than is absolutely compatible with safe potable water, yet they are not in themselves capable of doing any harm to man, having been consumed by him with impunity since the commencement of human life on the globe.

How may we, then, render suspicious water absolutely safe?

By boiling. This rids it of carbonate of lime, of iron, and of hydrogen sulphide, and lessens organic matter. It does not destroy, for a certainty, all bacteria, for Professor Tyndall has shown that there are stages in the life-history of the bacteria during which they can resist any *moist* heat. *Repeated boilings*, however, by destroying each time a crop of these in the stages during which they are liable to death by a temperature of 212° F., is therefore the only sure means of rendering water, during epidemics of cholera, typhoid fever, scarlatina, and diphtheria, absolutely safe as a beverage. *Distillation*, if properly carried out, renders water, from whatever source contaminated, absolutely safe. *Free exposure of suspicious water to air-currents* and the agitation in it of coke, spongy iron, or even scrap iron, always lessen and sometimes suffice to remove all danger. *Filtration*, when efficiently carried out, is also a potent purifier of water from dangerous germs. The filtering medium should by preference be spongy iron, the magnetic oxide, or the carbide, of iron. Nothing organic, such as cotton-wool, must enter into the structure of the filter, and all metal, such as iron, upon which water can act, must be protected. Filters of such construction do not require cleansing oftener than once in every nine or twelve months. Charcoal, animal or vegetable, is not a good filtering medium, and in cases where it is relied on should be thoroughly

cleansed—either brought to a red heat, or, failing that, well boiled in dilute Condy's fluid, and afterwards thoroughly washed and well exposed to the air and sun—at least once in every three months, and even oftener than that during an epidemic.

The "Filtre Rapide" of Maignen is an excellent and efficient apparatus, especially in camp and hospital, or in large domestic establishments, where quantities of water are constantly in demand. Like every other filter, it must be frequently cleansed, and the straining material renewed, according to the work it has to do (to be measured by the impurity of the water passed through it).

Many other beverages, besides water and milk, were occasionally the subjects of intermixture with articles deleterious to health, but as at no time were they such as to constitute very grave danger, and as at the present day in England they have, thanks to the Adulteration Act of 1875 and its Amendment of 1879, almost ceased to exist, an enumeration of them here would answer no practical end.

II. *Foods relatively Unfit for Man.*

Having then completed our review of foods which, as regards their effect on man, may be regarded as essentially bad, we now turn to the larger half of our subject, that which deals with food but *relatively* unsuitable.

We all know that many men, otherwise vigorous and strong, have, in order to avoid discomfort, to exercise caution in their selection of food, while others, often of much the same age, temperament, habits, and occupation, can eat with impunity of almost every ordinary nutriment.

Whence comes this difference in the digestive capacity of individuals placed in like circumstances? The cause is to be found far back, in the lives and habits of the fore-

fathers. Rather, however, than attempt in one or two special cases to trace cause and effect, I will briefly sketch the origin of all digestive incapacity.

Primitive man had few incentives to action, and of these hunger was doubtless the chief. We may, perhaps with truth, say of him, that food was his thought by day, his dream by night, hunger his main incentive to action, instinct his guide, and satiety his limit. Nevertheless, judging by the specimens of his bones and teeth, the troubles of indigestion and the many diseases with which we are to-day afflicted were as unknown to him as to the other wild denizens of the primeval forests.

The causes which led to the slow aggregation of mankind into tribes and nations do not here concern us; we only know that after a lapse of time the population of the earth became partly urban and partly rural, and that the former, accumulating wealth by trade and other means, fell into habits of luxury, and, discarding the simpler foods, of which an excess could scarcely be consumed by reason of the deadening of the palate and the sense of satiety which marked the normal limit of demand, and blocked, as it were, a further consumption, sought, by ingenious stimulation of the palate by a variety and multiplicity of flavors, and of the stomach by hot condiments, to develop and expand hunger and eating from the fulfilment of a natural demand into a means of sensual gratification.

But if, by reason of the comparative inaction of their lives, there was at once a lessened need for food, and an enormously increased consumption thereof, is it at least not to be considered strange that all communities of men were not promptly exterminated by disease? But no such consequences appeared; a general and gradual deterioration of type was the sole result, for there were pres-

ent several safeguards against a more rapid decline. In the first place, there was constantly an infusion, by marriage, of fresh blood from the rural population; in the next, there was the potent influence of *habit*, the body being able then, as now, without loss of health, to become habituated within certain limits, and, provided the process was gradual only, to altered conditions, of which an excess of food was one; and, lastly, Disease put out, when the narrow limits within which habit could save were exceeded, her *merciful* hand, checking Dives as he approached destruction, and throwing him back, often violently, into the path of health.

Spite of these several brakes upon a downward career, a continuance of folly ended, as I have said, in deterioration, marked mainly by a premature failure of the digestive capacities, and, since digestion goes on in every organ of the body, by a generally premature advent of the signs of old age, most marked of course in those organs upon which the greatest strain happened to be thrown.*

But the consequences of luxury and excess were even more grave and far-reaching. The crowding together of human beings, the unnatural and fermenting excreta and the absence of adequate means for their speedy removal, co-operating with other effects of overcrowding and overfeeding, provided a novel surrounding for those ubiquitous denizens of the air, the germs (the bacteria), and consequently effected in them a metamorphosis. The common beneficial bacterium of ordinary putrefaction developed in such places into a different creature, and became at once dangerous because it constituted a new, and therefore an unbalanceable, force in the environment of

* The food system, as I have already remarked, is the great bodily system whose requirements almost every bodily organ may be said to subserve.

man, and consequently strange and fatal diseases, which, selecting by preference those individuals whose bodies were most debilitated by excess, now made their appearance.

This new force—the fever-germ—ravaged, as we know from history, large tracts of country, and, had it not been again for the protective influence of habit, by the operation of which even the new force lost after a time its novelty and therefore its danger, in proportion as the bodies constantly or frequently exposed to it became more or less habituated to its influence, mankind must have perished from the earth.

Thus originated epidemic disease, and this is the explanation of the strange phenomenon that, in different races and at different periods in history, a blood disease will show that extraordinary difference in its death-roll.

Such is a brief epitome of the genesis of epidemic disease on the earth, nor is it in any sense a speculative one, for any one of my readers may, by the aid of a good microscope and a little nitrogenous fluid, such as blood serum, develop and cultivate from the ordinary germs of the surrounding air other and different beings, and may further vary these forms by the exclusion or diminution of their oxygen supply, or by otherwise altering their environment. He will, moreover, find that the fresh blood serum may be introduced into the veins of an animal without causing any mischief, while that in which the new bacteria have developed will, according to their stage of development, set up the most violent of blood maladies.

We are, however, not concerned just now with the origin of blood disease, but only with the tendency to break down prematurely, under ordinary work and with ordinary food, which so many people of the present day exhibit, and which they have inherited from their ancestry.

It will nearly always be remarked that the unfortunate possessors of enfeebled digestive organs start life apparently well, and generally exhibit no sign of any special weakness till after puberty. Then, perhaps at twenty-five years of age, perhaps not till ten or twenty years later, in any case prematurely, one organ, usually the liver, begins to hang out signs of distress in the shape of biliousness, gout, rheumatism, gall-stone formation, etc.; the weakest organ is, in fact, most rapidly coming to the end of its stock of vitality—its capital in which was small at birth —and is exhibiting early in life the signs that appertain, in a stronger organ, only to old age.

The patient is often loud in his complaints. What, he asks, has he done to merit this disaster? He may have done, in ignorance, a good deal towards it, or nothing; may, in fact, have simply inherited it from his ancestors, as he inherited their other traits. It does not matter very much, however, what the precise cause; the derangement is before him, and he has to face it. Now the key-note of treatment in these cases is *economy*. The organ or organs of digestion have some power left. He must cut down and simplify the food and make this residue of power to suffice for as long as possible. "I am well enough, now that I have consented to be always ill," said Gustave Flaubert, and in this sentence lies the whole philosophy of life for the dyspeptic. Such a one is the shorn lamb to whom the wind must,by artificial means, be tempered. Clothing, climate, and, above all, food, must be nicely adjusted to his bodily needs, for only under those conditions can he be, and remain, well.

But we know that the digestive function is conterminous only with the body, and thus indigestion, while generally more marked, more demonstrative, in some organs, such as the stomach and liver, than in others, such as the

blood-vessels, is therefore in every sense of the word a general, and in no sense a local, disorder. And therefore the following directions will be found suitable for most cases of chronic ill-health and debility, even if such have no apparent causation in defective digestive power.

The subjects, then, of *gout*, *rheumatism*, *glucosuria* (dependent on liver derangement), *Bright's disease*, *functional albuminuria*, *biliousness*, *gall-stone*, and any form of *chronic nervous or physical disorder*, should, unless there be some very special contraindication, observe, as regards food, the following rules:

Avoid frequent and mixed meals, especially the excessive consumption of meat.

After thirty years of age, two full meals a day usually suffice.

Breakfast may, unless there be present, as in gastric catarrh, much morning nausea, be a full meal, for very rarely does dyspepsia follow in the wake of breakfast, for the stomach comes to this meal rested and reinvigorated by sleep and also completely empty. Another great reason why the first meal of the day is usually for the dyspeptic the most satisfactory one is, that the nervous system, itself supplied and kept in due action by food, watches over and regulates the digestive acts, and this system is also in the morning at its best and freshest. Breakfast, then, may be a liberal meal. A little porridge and milk, followed by fish or bacon, bread or toast and abundance of butter, and concluded, if possible, with a little ripe fruit, makes generally an excellent form of repast. Coffee and milk, half and half, is the best beverage, but there is generally no objection to be raised to the substitution for it of tea, cocoa, or even of some light natural wine well diluted.

Midday Meal.—Few busy men who have to work with their nervous systems can, without great risk of either

painful indigestion or of subsequent temporary diminution of brain power, as shown by drowsiness, take with safety a heavy midday meal.

A few plain biscuits and butter, with one or two cups of coffee, form for such people an adequate midday meal. If more food be desirable, then a little plain boiled fish or a few sandwiches may be substituted, and, if constipation be a source of trouble, a little fruit may afterwards be consumed.

Dinner.—This meal should be taken not only after the day's work has been done, but after it has been, if possible, also *forgotten.*

No one can digest a full meal with trouble or anxiety on his mind, or even immediately after great physical exertion. The patient must remember that he does not bring to this meal, as he did to breakfast, a reinvigorated nervous system, but one that is more or less exhausted by the occupations of the day. He should therefore, if possible, get a little rest between the termination of the day's labor and his dinner, and divert his current of thoughts into pleasant channels. If he cannot do this, cannot shake off the worries and fatigues of the day, he must be contented to make a very frugal repast; there is no other wise alternative.

Dinner is a meal that may take so many forms, and be eaten under such different conditions, that I shall confine my remarks to one or two general hints only.

The dyspeptic, as a rule, will do well to shun soup. It does not wash away or dilute the digestive fluid; that is a superstition to which nobody with the least knowledge of the functions of the stomach will subscribe, but a large quantity of warm fluid can debilitate the muscular coat of the organ, and on the contractile powers of that coat, quite as much as on the amount of gastric fluid, depends

perfect digestion. However, be its influence what it may, experience is fairly unanimous in its condemnation of soup. Both fish and meat may be taken. Vegetables, with one exception, may be freely consumed as a general rule, though I am strongly of opinion that bread or toast only should be eaten with meat and fish, vegetables following as a separate course. The one exception in vegetables is the potato. This tuber consists very largely of starch, and, as ordinarily served up, of starch but partly cooked. Nor boiling, nor baking, nor frying can generally suffice to rupture completely its starch grains; prolonged roasting alone can effect that, and roasted potatoes alone are therefore digestible. The test of complete cooking in the potato is the measure of its mealiness, for all starchy foods when thoroughly cooked tend to fall to pieces. For this reason bread cannot be made from maize-meal, barley-meal, or oatmeal, while it can be from wheat-meal and rye-meal, as these substances contain a special substance called gluten, which binds together the starch grains.

With regard to sweets, most dyspeptics will do well to avoid pastry and puddings, even milk puddings. Stewed fruit and cream may be taken, and to a snack of ripe cheese there is no objection. Ripe fruit may often beneficially conclude the meal.

The beverage at dinner is a difficult matter to settle. Water is undoubtedly the best, but a little Rhenish or Moselle wine, or a light claret or Burgundy, well diluted with a plain or sparkling water, may be usually allowed. Cider is sometimes a permissible beverage, even for gouty patients.

Late Meal.—No further meal is, in the majority of cases, necessary after a late dinner. If one be necessary, it should be light and digestible, and consist of a farinaceous pudding or of a few biscuits.

Of course many exceptions may justly be taken, in individual cases, to even such a limited diet scale as that which I have here sketched, nor do I recommend that much weight be attached to the restrictions, either in amount or kind, of any set dietary. The great facts which the dyspeptic has to bear in mind are that digestion depends very largely upon the state of his nervous system, and that therefore it is important to come to each meal as light-hearted as possible; that six or eight hours at least should elapse between any two *heavy* meals; that the demands of the body, in the way of meat, are less as life advances; that the demand for other foods diminishes also in proportion to age and to the smallness of the daily toil; and that, lastly, an adequate supply of oxygen is necessary to burn the fuel-foods, and of muscular movement to remove the final débris of food from the body; to secure which two desiderata he must each day take a reasonable amount of outdoor exercise, or, by preference, outdoor amusement.

One is constantly asked about the digestibility of fat, of starch, of sugar, of infusions of tea, of raw vegetables, of pastry, of cheese, and especially as to the utility of alcohol. I will briefly touch on the virtues and the vices of these substances.

Fat.—The sole destiny of fat in the body is, in conjunction with oxygen drawn in by the lungs, to undergo combustion and supply heat.

The above aphorism, first enunciated by Liebig, is strictly true, but it does not comprise the whole truth.

Indirectly, fat, like gelatine, while it cannot replace albumen, can economize it. Thus, Dr. Germain Sée found that a dog fed on 1200 grammes of lean meat a day still lost steadily a little of the albuminous material of his body, while the same animal on 500 grammes of meat

and 200 grammes of fat kept, to use Dr. Sée's expression, his nutrition account-book balanced. Rubner's experiments on man led to a similar conclusion. He found that one who consumed 1435 grammes of lean meat a day, containing 48.8 grammes of nitrogen, lost daily by the kidneys 50.8 grammes of nitrogen, while on 400 grammes of fat and less than 700 grammes of lean meat, the nutritive balance between intake and output of nitrogen was restored.

Fat is, then, when once the stomach has been passed, a substance easy of digestion and a potent economizer of albumen, that food material most difficult of digestion, and whose mal-digestion leads to a long array of grave degenerations.

Now, for the reasons just given, it is evident that the gouty, the rheumatic, the albuminuric, the bilious, the dyspeptic of every grade, all of whom have great difficulty in the final digestion of albuminoids, ought to partake freely of fat, and yet these are precisely the individuals who find that fat disagrees with them, and we have in the above facts a clue to the reason underlying their objection ; for it is evident that if fat be freely taken in a dietary already too rich in albuminoids, it must aggravate the disorder, while if the fat selected be one specially prone to undergo fermentation, and if it be consumed in company with a heavy meat and starchy supply, it is quite conceivable that, in an already debilitated stomach, it may undergo a rapid conversion into that highly offensive and irritating fatty acid called butyric acid. Now, it is this tendency of fat to undergo fermentation and to change into butyric acid, in short, to become rancid, which has first to be guarded against, and when this difficulty has, by a little management, been overcome, then the variety of patient of which I have spoken will speedily be convinced by his

own feelings that a liberal supply of fat, and a decreased amount of meat, conduce very powerfully to his general well-being.

To pass the feeble stomach with comfort, fat must be digestible, fresh, cold, and not taken with, or combined in, indigestible admixtures.

Well-made fresh butter stands first in the order of digestible fats, then comes bacon fat, then cold beef or mutton fat, then cream. Besides these we have the easily assimilated pancreatic fat emulsions in the market, and the somewhat distasteful, but often very useful, cod-liver oil.

Fat in any of the following forms should be shunned: When it is hot; when it is not only hot, but mixed with sauces, condiments, and other substances, as in ragouts, etc.; when it is not quite fresh; when it is mixed, as in pastry, with flour, and the flour is but partially cooked; when it is mixed with flour, sugar, currants, etc., in cakes. The two latter substances—pastry and sweet cakes—are often subject to the further objection that the butter used in their construction is not of the freshest. Finally, fat must not be consumed in large quantities if a large and somewhat indigestible admixture of meat* and farinaceous pudding already occupies the stomach.

Starch.—Many gouty and dyspeptic people are exceedingly chary of consuming potatoes and farinaceous puddings, while they partake of bread and toast freely. There are two reasons that account for this distrust. In the first place, the starch-grains in potatoes are rarely thoroughly cooked, the same being true, but to a less extent, of most farinaceous puddings, which to be easy of digestion should not contain eggs, which tend to bind together the starch-

* It is also to be remembered that when overmuch meat is consumed fat tends to aggravate all the consequences of such excess.

grains, and should be slowly cooked ; and, in the second place, it is evidently likely to over-tax a weak liver to compel it to deal at the same time with both the albuminoids of the meat and the grape-sugar resulting from the conversion of starch.

Sugar.—Cane-sugar, like starch, appears in the liver as glycogen and in the blood as grape-sugar, and therefore the remarks made on starch apply equally to this article. It is not, however, in the liver, but in the stomach, that the dyspeptic, especially if of the gouty type, experiences discomfort after partaking of saccharine foods. There can be no doubt that in many cases sugar is regarded, without sufficient proof, as apt to set up acidity. People who take highly sweetened *café-au-lait* or chocolate, or those dyspeptics who partake of sweetened tea, blame the sugar only if acidity ensue, forgetting that milk contains a fair proportion of fat in the form of cream, that chocolate is even richer in that substance, and that the tannin in tea and coffee, though certainly not injurious to a strong stomach, nor to one long accustomed to it—for the most delicate in China and in Australia drink large quantities of tea with absolute impunity—may nevertheless, when in conjunction with sugar, turn the balance the wrong way. Again, in pastry and sweet cakes, sugar is often a minor factor in the resulting discomfort.

Still, after eliminating all such sources of misstatement, the fact remains that, in some cases, plain sugar causes marked gastric acidity. It cannot be said that as yet we possess any perfect explanation of this phenomenon, though if the recent researches of Ellenberger and Hofmeister (*Fortschritte der Medecin*, June, 1886) be confirmed, that grape-sugar undergoes a temporary change in the stomach and intestines into lactic acid, it may well be that in states of feeble digestive action, and when the muscular tone of

the stomach is impaired, this conversion may take place almost completely and solely in the former organ. Not that the reader must infer that lactic acid is to be regarded as always abnormal when found in the gastric contents, for it is rare to extract fluid from a stomach even in the most perfect states of health without meeting with it; it is only an *excessive* amount thereof which can cause serious digestive impediment.

Tea.—In dealing with such a subject as tea, about which so much that is useful, and so much more that is nonsensical, has been written, I shall confine myself to a very brief, *pro* and *con*, summary.

In persons of robust digestion tea may, with impunity, be partaken of. In delicate people the following precautions must be observed. It must be fresh ; not taken except after or towards the end of a meal, for all hot fluids poured into a flabby, non-contracted stomach have the natural effect of drawing gases from the intestine through the relaxed pyloric orifice. It should be taken in moderation, four to six tea-cups per day being the outside limit. If with such precautions it still disagrees, tea may be taken without milk, with little sugar, and with an addition of ten drops of lemon-juice to each cup ; or to each cup of tea, sugar, and milk may be added a very small pinch of bicarbonate of sodium.

Cold or iced tea—that is, an infusion of tea that has been poured into a receptacle as soon as it has been made and there left to get cool—even when consumed in very large quantities and by delicate people, rarely disagrees.

Tannin, the bogie of the glass-tube experimentalist, is *not* the source of the discomfort that is observed after drinking a well-made infusion of tea. Coffee contains, according to such excellent observers as Stenhouse, Rochleder, Mulder, and König, a nearly equal amount of this

substance, and the red wines of Bordeaux and of the Côte du Rhone may be said, considering the relative quantity consumed, to contain much more, while against none but tea has the charge of tannin-poisoning been raised. In fact, tannin is one of the commonest ingredients in nature, and must, from the earliest times, have been partaken of daily by almost every human being, and such a substance cannot readily, even if consumed somewhat in excess, become deleterious. Sometimes, indeed, a slight excess of tannin acts as a direct stimulant to digestion, and Peruvian bark owes largely to this ingredient its power of temporarily bracing up the digestion and the whole body.

The question of the suitability of *raw vegetables* in states of indigestion will need but a brief notice. Lettuce and water-cress alone may thus be eaten with safety.

Cheese, like eggs and all other varieties of concentrated food, will often disagree, but its digestibility increases as a rule with its advance towards decay. This is simply due to the fact that the adhesiveness of the individual particles lessens as the cheese ripens.

To the *indigestibility of pastry* in most cases of dyspepsia I have referred already.

Alcohol.—Of all the substances commonly entering into the dietary of man none is a better example of a food often relatively improper than alcohol. We are fortunately not concerned with the burning question of habitual alcoholic excess, for we have long since made up our minds that excess of every kind is harmful, and we know that there are many common articles of food—notably salt—even more rapidly fatal than is alcohol when the amount consumed out-measures considerably the physiological demand.

All we require to know is, briefly, in what cases alcohol may prove a useful food, or adjunct to food, and in what cases it is inadmissible.

But, in the first place, is alcohol entitled to the rank of a food? Though it undergoes, without doubt, some change in the body by the aid of the oxygen in the blood-current, yet it cannot be said to be a food in the sense that albumen, fat, starch, and sugar are aliments. It is not a repair material, and it is not a source of heat or of force. In fact, its position is almost unique, for it plays the *rôle* of a brake applied to the wheels of life, arresting the oxidation of the other foods, and, hence, the wear and tear of the tissues. But since the chemical interaction of cell and albumen is life, and the union of oxygen and fuel in the body is the source of heat and motion, surely a check put on these processes is equivalent to a mischievous interference with useful vital processes. This is indeed so, and therefore, unless the amount consumed be very small and be well admixed with other substances of dietetic use, and, furthermore, unless habit has, as it can, made of even this small daily quantum of alcohol one of the ordinary conditions of life, alcohol must be condemned as a deleterious substance for a healthy man, at any period of life, to consume.

But, to be entitled to take rank as a nutritive aid, the daily consumption of alcohol must be confined to strict limits, for, since it lessens the oxidation of the foods, it must, and does, also decrease the heat of the body, and for the same reason it promotes the deposition of the unburned fuel-foods in the body in the form of fat, is, in short, one of the most common causes of obesity. Therefore at once, and even in the absence of other, strongly confirmative, social facts, patent to every one, we are compelled to admit that, unless, as I have already said, kept in check

by habit and by a very restricted consumption, alcohol is more of a harmful than beneficial agent, its sole nutritive virtue being of a negative character.

But alcohol is rarely taken with the purpose of increasing weight, and still less often with that of reducing bodily heat; in its stimulating effects on the body at large, and particularly on the brain, lie the great temptations to overuse. Furthermore, to maintain the stimulating effect and to anticipate reaction, the dose must steadily increase. What must be the end of such a course? Premature breakdown (fibrous degeneration) of the heart, the arteries, the liver, and the kidneys, leading to a general impairment of nutrition, masked for a long time by that tendency to the deposit of fat which gives to the drunkard often the appearance of health and vigor when the vital organs are actually tottering on the verge of final collapse. But the organ most stimulated, the brain, suffers most severely. Whipped up for long by the alcohol, its functions may not seem to suffer or may even for a time appear to improve, but it is a delusive improvement, due to the prodigal exhaustion of capital, of brain-cell vitality. The approaching bankruptcy of this organ becomes sooner or later so clear as to be no longer capable of concealment from the least observant, and the failure of its will and control functions reduces the sufferer to little more than an automaton.

But we have no right, because the spectacle presented by excess is shocking and frequently witnessed, to shut our eyes to the fact that small amounts of alcohol possess qualities which may be turned to useful account in disease, and which, within certain limits, are incapable of harming a man in health, nor is there any sound logic in an argument which, by calling alcohol unnatural, seeks to beg the whole question, for that only is natural to man to

which his body, without deterioration, can become habituated, and it is abundantly evident from the past history of the world that to alcohol, in certain proportions, man can become so acclimatized as to gradually overcome even the tendency to obesity and the decrease of heat which are the first and invariable signs of its influence on bodies to which it holds the position of a new force.

But we must not be enticed further than is necessary for our purpose into a disquisition on this subject; we now know enough to draw the following conclusions.

Alcohol, in restricted quantities, of the ethylic* form, and taken diluted and preferably admixed with other foods, becomes an actual agent in the maintenance of health in those acclimatized to it by heredity or habit. In such it cannot, any more than any other factor in the environment, be omitted without inducing some derangement. In the young and strong, in those, in short, whose bodies possess a high degree of adaptability, it may, however, be dispensed with at any time, and the derangement produced by its sudden discontinuance will be but slight and transient, the body soon fitting itself to altered conditions; in the debilitated and old, and in all those who have a difficulty in maintaining equilibrium or health, it cannot, without risk of serious disorder, be suddenly cut off, and in the rare cases where its discontinuance is plainly necessary, the process must be carried out slowly and cautiously.

In some conditions of ill-health, especially in those states—of which we have an example in the early stage of consumption—where it is difficult or impossible to keep up the balance between the absorption of ordinary nutri-

* There are many alcohols: ethylic alcohol is apparently the only one to which the human body can become, without disorder, habituated.

tives and the necessary waste of tissue, alcohol is a most potent auxiliary food agent. Wisely used in such emergencies, it can actually arrest that process of going steadily to the bad which soon places the sufferer beyond all human aid, all chance of cure. It stops the leak, enabling the body to hold its ground till substantial aid of other kind is forthcoming. The form it may then take will depend upon the digestive capacity, and a misjudgment in this respect may turn a benefit into a disaster. In most cases a light, natural wine, preferably red, is indicated. Red Rhine wine, Burgundy, or sound, full-bodied Bordeaux, or even Australian, Cape, or Greek wine, may be selected, according to idiosyncrasy or to special indications. If the digestive capacity be weak, a white wine must be substituted. The daily amount necessary to the purpose will vary in each case, and must be judged of partly by our own observation of the effects witnessed, and partly by the sensations of the consumer. Port, long in wood, is sometimes very useful, and even old bottled Port, Madeira, Tokay, Constantia, Bucellas, and Château d'Yquem may in some cases be taken with greater benefit than the lighter wines. Sometimes stout, old ale, or light beer will do more good than wine, or a small quantity of some spirit, old brandy or whisky, may, with greater advantage, be taken in milk two or three times a day.

It is almost unnecessary to add that alcohol may be of considerable use as a food adjunct in fever, for that is, *par excellence*, a state in which the drain on the tissues is great. Much of the discredit attaching to the employment of alcohol in fever is due to the utter carelessness, to the habits of brainless routine, which mark its employment, especially in hospitals. The actual waste of the body must first be approximately gauged ere anything

else is done and the dose be proportioned to it. The amount required will often be extremely small; a teaspoonful of brandy every three hours is usually ample. But this restricted dosage does not satisfy the young medico thirsting for distinction, a tablespoonful or more must be administered frequently, till in fact the results of the brandy are manifest to every sense in a slower, fuller pulse, a return of light to the partially obscured consciousness, a moistening of the dry, parched tongue, a general and, at first sight, most satisfactory vivification of the patient. Then a pæan of victory is chanted, alas! often to be changed to a lament for the dead. The small balance of life in the poor sufferer, that which it was the duty of the medical man to husband for the days of trial yet in store, has been madly whipped up to make a temporary flare; there is simply no more behind it. But such reckless foolhardiness, which is what the public, judging by their experience, comprehend as the treatment of fever by stimulants, is utterly opposed to the wise and scientific application of alcohol as a brake on the downward path of the fever-stricken. We want no stimulation; we dread it; we know the penalty that must be paid for it. All we seek is to place a check on the constant drain of tissue that is endangering the life of the patient, and this *can only be done* by a small dose. This point must be grasped, and it must not for a moment be thought that it rests on the unsupported *ipse dixit* of the author. Let the doubter listen to the opinion of one of the most eminent and most truly scientific dietetists of the day, Dr. Germain Sée, of Paris. "By the aid of alcohol, as of fat, urea diminishes, and, as a consequence, the bodily weight increases; the tendency of even moderate drinkers to obesity is well known. *It is only when the dose of alcohol is considerable that the elimination of urea becomes stationary or even*

finds itself increased. Thus one may say that alcohol, like fat, is a means of economy for the organism; a verification of the doctrine of Von Voit on the conservative action of certain substances in common use" ("Régime Alimentaire," p. 146, Paris, 1887).

Thus we possess in alcohol a most useful agent, by the use of which the intake and the output of the body may be balanced when other means cease to avail.

Doubtless the reader, accustomed to the ordinary handbooks, will be not a little dissatisfied to find that I do not attempt more precise directions as to the amount and the kind of alcohol suitable for each class of derangement. It is the fashion, and a most mischievous one, to regard each disease as a separate entity, to be dealt with on certain fixed scientific lines. People speak of gout as if it existed in concrete form. Practically there is no such thing as gout, but there is often to be seen in this country the spectacle of a gouty man, and it is emphatically the man and not the gout that has to be treated. How bitterly does the newly fledged practitioner recognize this fact. His treatment of gout is perfection, he can repeat the *ipsissima verba* of the text-books, but he is, nevertheless, often at sea when in presence of a gouty individual. The difference between the two is a very real one. The books recognize but two or three varieties of gout, but each gouty man is a variety in himself, simply because he is a man differing in many points from all other men, and he demands treatment as a separate variety. Furthermore, the treatment suited to his case to-day may not be that which proved serviceable to him ten years ago, for he has since, by change in his tissues, become, to all intents and purposes, a different man. It is precisely because the truth of these facts obtrudes itself, often so unpleasantly, on myself as a medical man, that I feel unable to pledge

myself in any directions as to alcohol to more than the few following general facts:

(*a*) The consumption of alcohol in health, for the sake simply of the stimulation it affords, is dangerous, for it generally leads to over-indulgence.

(*b*) Persons habituated to the use of small quantities need not discontinue the consumption, especially if, after a fair trial of abstinence, they do not remark an improvement in their general health.

(*c*) Concentrated alcoholic fluids should never be consumed; their effect on the stomach lining is that of a caustic, and most pernicious. It is, moreover, well to confine the drinking of alcohol to meal-times.

(*d*) Certain combinations of alcohol, not on account of the alcohol, but of its admixture with other ingredients, must, as a rule, be shunned by all dyspeptics, whether they be gouty, rheumatic, glucosuric, neurotic, or what not. They are as follows:

New and highly fortified wines.

Champagne, especially if sweet.

Light natural wines that have begun to alter (to undergo acetous fermentation).

Spirits, such as rum, containing much unfermented sugar.

The heavier malt liquors — *e. g.*, old ale, stout, heavy beers.

In rum, and sweet, fortified new wines, such as are most ports and sherries, and in sweet champagne, the ingredient which hampers digestion is mainly the unfermented sugar present, that undergoes a very rapid and premature metamorphosis into lactic acid upon reaching the stomach, deranging the whole digestive process in that organ, and thus favoring various other fermentations. In badly kept light wines, acetic acid, or vinegar, is often present, or if

not actually existent at the time of consumption, becomes soon developed in the stomach. In malt liquors of the heavier kind there exist various essential oils, notably lupuline and hopeine, real vegetable narcotic poisons, which hamper, by their effects on the nervous system, all the digestive acts, and are the causes of that heaviness which so often follows the consumption of these beverages. Well-made and well-kept natural wines poor in alcohol, well-kept cider, light beers, and whiskey, cognac, and unsweetened gin are, as a rule, the only safe alcoholic beverages for the debilitated, the dyspeptic, and the fever-smitten.

The Question of Dietaries.—Unquestionably I shall be held to have shamefully neglected my task if, presuming to treat of foods, I neglect to recommend some new dietary or some novel arrangement of the older ones.

And yet I shall certainly make no such effort, but shall confine myself to the pointing out of certain advantages and certain drawbacks in some of the more prominent systems, a comprehension of which may enable the reader beneficially to make use of them within wise limits, not always indicated by their special champions.

For, after all, it is very much with a man's dietary as with his soul, general directions of rule and conduct can only be given, it being left to his inward mentors, in the first case his judgment, in the second his conscience, to adapt such directions to the special requirements and conditions of his case. It is true that the smaller manuals of physiology—forced by stress of restricted space to be dogmatic in their statements—seem to countenance the feasibility of a set dietary, at least for the healthy man; and, indeed, it is on a study confined to such elementary works that the dietetic amateurs of the day, when they condescend to give reasons for the faith that is in them, found their arguments; but a deeper study of the great masters

of physiological science fails to support this view, and shows rather, by the numerous exceptions which follow each statement, the great reluctance with which, when they venture to do so at all, they lay down a dietetic rule of life.

Health, as I have so often reiterated, is indeed a fixed and settled state, one of balance between a body and its environment, but the weights that form the poise and counterpoise *differ* in each and every case. When it comes therefore to a condition of ill-health, to loss of equilibrium, it is clear that what may nicely suffice to restore a balance in one case, will, in another, either have no appreciable or an over-powerful effect.

Vegetarianism. — Among the dietetic competitors for popular favor at the present day, vegetarianism holds a prominent place, and may justly boast of influential and able supporters. It is boldly claimed for it that it is *the natural* dietetic system of man, that for which he was made and is best fitted; that when adopted, it, in the vast majority of cases, promotes longevity and vigor; that it clears the mind and regulates the mental processes; that it both cures and prevents gout, biliousness, rheumatism, epilepsy, dyspepsia of every shade, and not a few other complaints, and that it is cheaper than a mixed dietary.

Turning to geography, the vegetarian points to the vegetarian feeders of the day—the Arabs, the Turkish porters at Smyrna, the Chilian miners, the Russian peasantry, all examples of muscular strength and of robust health; coming to history, the Greeks of Leonidas, the Persians of Cyrus, the Swedes of Gustavus Vasa, among groups of men; Pythagoras, Socrates, Seneca, Buddha, St. Chrysostom, Milton, Byron, Voltaire, Schiller, and Linnæus, among individuals, are solemnly paraded before us as the products of a vegetarian diet; while even comparative anatomy is pressed into the service, and our near anatomical

relative, the monkey, is brought forward as a strict vegetarian to shame or to convince us.

In fact, so able have been the advocates of this system, and so special their pleading, that, even in the upper ranks of medicine, men of wide reading and sound judgment—and not of the common limpet order—have been enticed away; while of suffering laity, legions of the halt, the maimed, and the blind have sought physical salvation in renouncing the flesh of all that creeps, runs, flies, or swims.

A system such as this, with its pretence to a universal application both in health and in disease, with its promise to regenerate the race by abolishing poverty and reducing vice to a minimum, and embodying, it must be added, great truths, calls for some detailed attention and analysis.

Like all systems founded on a one-sided review of history and on limited and often unintentionally biassed personal observation, vegetarianism propounds great truths of wide, but, alas! not of universal application. It speaks the truth, but not the whole truth. It is, among systems, a fine specimen of the limpet kind, but it cannot justly claim to have covered the whole rock of scientific truth.

Let us make an attempt to read the riddle of its successes and its failures.

And, first of all, what claim has a vegetarian dietary to be considered the original and only natural food system of mankind? None whatever, for, whenever we turn to ancient history, sacred or profane, we find among the earliest records unquestionable evidence that mankind, even with unlimited and convenient vegetarian food at his doors, preferred rather to risk danger in the chase or in the prolonged night-watching and exposure incurred by the custody of flocks, with a steady view to their eventual consumption, than to restrict himself in his food to the very accessible sources of a purely vegetable order. Again, if

we penetrate more deeply into the earlier evidences of human life on the globe, we find that the manufacture of weapons by primeval man was an early art, even earlier than the construction of utensils to be employed in cooking, and it is difficult to believe that primitive man, when he had the good-fortune to slay a wild animal, could resist the temptation of consuming him, surrounded as he was on every side by the evil example of carnivores.

However, let kreophagy have commenced when and how it may, there is no evidence that the practice was, or is, a transgression of any natural law. It is evident that the body soon accommodates itself to such food, the true and only test of any material being natural, for there is no fixed standard in such matters—though a presumption of such is implied in the arguments of dietetists—and in food, as in other conditions of life, the field over which mankind can wander without transgressing the bounds of Nature is for him, more than for any other animal, a wide one. As to the argument sometimes advanced that the vegetarian who returns suddenly to a full meat diet will often, even generally, experience discomfort, while its truth may be admitted, proves nothing, for this is true also of the kreophagist converted to the vegetarian system. When you suddenly alter the weights in a balance there will be a little oscillation of the arms before the quiet of equilibrium is again restored, however exactly the weights may have been readjusted.

Neither, on the second postulate advanced, that of greater vigor and longevity, is there any proof of the superiority of an exclusively vegetarian system over a mixed diet; indeed, the palm of vigor, of fitness to survive in the great and eternal struggle for existence on this earth, would seem to rest with the flesh-eater, while on the question of the greater prolongation of life on a dietary into

which flesh-food enters not, we have absolutely no evidence. Truly, in certain religious communities, especially in some that follow the rule of the Catholic Church, with an abstinence from all but vegetable food, is witnessed a vigorous and intellectual old age. This, however, is equally true of other orders not debarred by their rule from meat, and cannot therefore be ascribed solely to their dietetic system, though, for reasons to be presently given, it must reckon as one of the factors in the result, but is due rather to the exclusion of their votaries from the worries and dangers of life in the world, and from the consequent wear, tear, and misuse of brain-tissue, and to many other conditions favoring length of days.

That a vegetarian régime generally promotes mental clearness, and favors a calm, even philosophical, frame of mind, and that it holds in great check the passions, is true; and that it is a most efficient means for the prevention and cure of gout, rheumatism, biliousness, some forms of epilepsy, and most varieties of gastric and intestinal dyspepsia, I think must also, in justice, be conceded ; but this is not due alone to the superiority of the vegetable element, but to other easily traced causes. What, then, is the rationale of the process—are the benefits derived durable, are they ever purchased at grave risk to life?

The effects observed are the direct and natural consequences of a diminution in the supply to the body of albuminous food, and probably to a slight extent also of the substitution of the less complex form of vegetable albumen for that derived from meat. Now, presuming that the vegetarian takes his directions from official sources, such as the Vegetarian Society, and eats, according to their directions, a certain amount of seed-food—*i. e.*, pease, beans, lentils, whole wheat-meal, oatmeal, maize-meal, etc.—per day, he will seem, when he turns to the tables of relative

food value of the various articles, and compares them in quantity and composition with his former meat supply, to take as much tissue food as formerly, or even a little more. This may be a fact, as far as the mere act of swallowing is concerned, but is by no means true of the amount as assimilated, of that, in fact, which passes into the blood to assist in tissue repair, and this for the simple reason that in vegetable seeds the intimate union of albumen with starch and fat and the hard covering of such seeds as escape the teeth or the cooking process tend to prevent the rapid digestion of albumen in the stomach which takes place in the case of meat. As an indisputable matter of fact, on a vegetarian diet, between 17 and 20 per cent. of the albumen is actually voided with the fæces, while but a minute fraction of animal albumen can escape, in health, the digestive fluids which it encounters. Habit, no doubt, after a time, fits the digestive faculties more completely to the consumption of such seeds, and indeed we know that in the horse and the cow a very active digestion even of starch proceeds in the stomach; but while habit is gradually doing its work, the body will run some risk of terminating its career—before the grass grows the horse may starve.

In the light of this undeniable fact—a fact which has its useful side—that vegetable albumen is, weight for weight, greatly inferior to meat in its power of entering the blood-current, and is therefore in considerable quantity rejected by the bowel, is explained the extraordinary power of a rigidly vegetarian dietetic system over gout, rheumatism, dyspepsia, Bright's disease, and some forms of epilepsy.

If you reduce very considerably the amount of albumen calling for digestion, you relieve of course immensely the organs whose duty it is to digest albumen, and of those organs the liver is the first. You also lessen, or remove

entirely, the products of mal-digestion in that organ, the direct and undeniable cause of gout, rheumatism, and of biliousness, gall-stone, and of many of the more troublesome secondary, and more remote, consequences of dyspepsia, of some forms of epilepsy and other nerve disturbances, and even the indirect cause of Bright's disease.

A peculiarity, and sometimes a very useful one, of the vegetarian dietary is thus a frequent action of the bowels by reason of the unassimilability of much of the food consumed, and which, while not indigestible in the sense of undergoing fermentation and inducing pain, is nevertheless, as we have seen, indigestible in the simple sense that it largely escapes the action of the gastric and intestinal fluids unsuited to such a combination. To this aperient action, to this cure of constipation, often accompanied as it is by flatulence, colic, and the absorption into the blood of the products of fermentation lying for long in the bowel—all of which are but too often traceable to a diet consisting largely of concentrated foods, foods deficient in waste material, useful as an intestinal stimulant to action —may, alone, be traced many of the smaller cures effected by the vegetarian regimen.

It might appear difficult to account on physiological grounds for the fact that, as the bodily strength decreases, and provided that the brain be not itself the seat of degeneration or disease, as in old age and insanity, nor its blood-supply poisoned as in fevers, an extraordinary condition of mental calm, not unmixed often with a strong religious bias, should take possession of the seat of thought. This serene and even temper of the mind may be partly, and is more probably wholly, due to the subsidence of the passions, which may be regarded as ebullitions of nerve force, the result of over-stimulation, the source of which is often to be found in excess of food,

especially of meat, which possesses more than one highly stimulating ingredient. We are familiar with the mental exaltation which ensues on a full meat meal, or on the consumption of a small amount of alcohol, and which may either take a general form, that of a sense of well-being, or, according to circumstances, and to the constitution of the individual, be directed into special channels and concentrated on special objects.

Cut off the excess or substitute an actual deficit, and such sensations diminish or vanish, and the individual, in place of feeling that distinct sense of stimulation, not unfrequently followed by torpor, to which he has been accustomed after each full meal, and which has possibly hampered considerably any mental work in which he has been engaged, experiences but a slight and merely comforting and satisfied sensation which in no way debars him from mental or physical work. We have a familiar example of the subdued frame of mind, the consequence and the sign of defective or of a barely sufficing nutrition, in tubercular children. These fragile mortals, whom it is difficult to feed, and almost impossible to fatten, do not exhibit the rough, daring, turbulent spirit which should and does characterize robust child-life, but are timid, quiet, obedient, attentive, and often pious, a delight and pride to their friends, though the old nurse, who has seen so many of this kind wither and die, will shake her head and express the opinion that such children are too good to live. As a further example of this mental condition, I may cite the lucid interval that in many diseases precedes death. As the heart loses propelling force the torrent of blood rushing through the brain, and which conjured up a rapidly moving panorama of visions, slackens, and a condition of mental calm in which there is no fear of death—for the hold on life is so relaxed that the strong contrast between

life and death present in the mind of the healthy is absent in that of the sufferer—and no desire to recover, lasts for a while till it slowly passes into the state of amentia which precedes death.

Vegetarianism, then, confers on its votaries the benefits of abstinence, all of which may, however, be secured on a low meat diet, or indeed on a full diet accompanied by a course of purgative medicine.

We are now in a position also to understand why purgative drugs have such an extensive sale; they remove, by sweeping prematurely from the bowel much food that would otherwise be absorbed, the myriad evils of excess. Many a patient has assured me that he owed his life to some aperient nostrum, and I have usually been able to agree with him on the point. Nevertheless, of the three courses above given the full diet with free purgation is the worst and most open to serious objection. As an example of a low diet in which meat enters I may quote the following, from Dr. Lauder Brunton's work, "Disorders of Digestion," p. 368:

7.30 A. M.—10 fluid oz. (½ pint) of hot water.

8 A. M.—Breakfast: equal parts weak tea and milk, a small quantity of white sugar, a slice of fat bacon without a strip of lean, bread, and fresh butter.

1 P. M.—Milk pudding, rice, sago, tapioca, macaroni, or blanc-mange, small biscuits and butter, 10 fluid oz. hot water.

4 to 5 P. M.—10 fluid oz. of hot water.

6 P. M.—Dinner: white fish or fowl (usually boiled), greens, bread, no potatoes, claret 7 fluid oz. (about ⅓ of imperial pint).

8 to 9 P. M.—10 fluid oz. of hot water.

11 P. M.—10 fluid oz. of hot water.

Such a dietary as the above, and which is quoted by

Dr. Brunton as that of a gouty friend of his, is quite as efficacious as any vegetarian one in keeping gout and the other disorders mentioned at bay and in the production of mental serenity, but it is open to the same objection—that of possible deficiency. Many as are the troubles that follow excess, a Nemesis advancing at first with very silent step, and then suddenly taking a serious form, often that of consumption, follows surely in the wake of deficiency. The late Dr. Anna Kingsford, a most clever physician, but an enthusiast in vegetarianism, though of exceptional physical strength, paid in that form the penalty of asceticism pushed beyond physiological limits, and I could furnish from personal experience many other examples of the kind.

From what I have said we may justly conclude that, as a not disagreeable means of affecting a considerable reduction in albuminoids where this is imperative, vegetarianism may often be commended, though the adoption of such a rigid system should not be undertaken too suddenly, or indeed at all, except under competent medical advice and supervision.

Lastly, I wish to remind the reader of what I have said about the utility of fat as an economizer of the albuminoids, and to say that a vegetarian dietary, *in which animal and vegetable fats enter freely*, is a very much fuller, and likely to be a very much more satisfactory, one than that from which all animal fats except butter and cream are excluded; indeed, vegetarianism plus a liberal allowance of fats of all kinds is, in my experience, by far the most satisfactory dietetic régime in gout, or, indeed, in any dyspeptic disorder.

The arguments in favor of vegetarianism drawn from geographical sources require but a brief answer. Man, when a strict vegetarian, is, in most cases, so by necessity,

not by choice. Vegetarian races tend to become, when circumstances permit of it, flesh-eaters, while flesh-eating ones never "vert" to vegetarianism.

The testimony of history is again in favor of the consumption of meat. Spite of the valor, perseverance, intelligence, and virtue of races or of men who have become accustomed to a sparse vegetarian dietary, yet, in the vast majority of cases where men following the two systems of food have been opposed, victory has declared itself in favor of the meat-eating race.

Even comparative anatomy affords but a poor shelter to the vegetarian advocate. True, the monkeys, those near cousins, in a physical sense, of man, are generally vegetarian-feeders, but one of their varieties, the baboon, is not. He will eat lizards and insects greedily, and in South Africa, at any rate, takes kindly to young kids and even to sheep, which he will seize, kill, and consume. The argument that, from a study of his teeth, it is evident that man was designed for a vegetarian system of feeding, is, in the light of the last thirty years' advance in the study of the origin of man and of his place in the world, truly an extraordinary one. We are, in short, asked to believe that, while every organ or portion of an organ of everybody has had to adapt itself to the circumstances in which it has been placed, an exception has been granted to this universal law in favor of man's dental armature, which, unaltered by custom extending back to the dawn of history and even probably beyond that limit, still stands forth as a solemn protest against a dietetic error.

Only of two other exclusive dietetic régimes need I speak, and of them but briefly: the milk cure and the grape cure.

The Milk Régime.—Milk contains, in the form of casein, of milk-sugar, of cream, of salts, and of water, all the necessary ingredients of human food, but not in the proportions

usually demanded by the body. Nevertheless, certain peoples are said to thrive well on an exclusively milk diet. This statement can, however, only be accepted with some qualifications. The herdsmen of the Alps add cheese and bread to their milk dietary, and the Piedmontese maize in the form of polenta, which substances contain much albumen and make up for the deficiencies of milk in this and other respects.

The peculiarities of milk that need to be noted are the following: Its albuminoid, casein, coagulates in the stomach, and this coagulum undergoes, generally, a remarkably easy digestion by the gastric juice. The separated cream, which consists of pure fat, is also exceedingly easy of digestion, rarely, even when present in considerable quantities, undergoing the rancid fermentation. The whey, which consists of water holding in solution the salts and nearly all the milk-sugar, is very readily absorbed. Milk would therefore seem to present us with an article of food quite of exceptional value both as to its composition, which includes all necessary forms of food, and as to the relative digestibility of these forms. Nevertheless, there are not a few with whom cow's milk, by reason of the coagulation of the casein, disagrees.

Many devices have been recommended to overcome the formation of a large and hard milk curd in the stomach. Barley water, rice water, soda and other alkaline waters, biscuit powder, sugar-candy, and other substances innumerable, have been suggested to this end as additions to the milk. Uffelman ("Archives de Physiologie," vol. iv.) has made a special study of all the processes recommended, and concludes that none of them are of any real use, and that, on the whole, it is better to forego a milk dietary in the cases when pain is found to be a rapid consequent of its consumption.

An exclusively milk régime is often useful in the following disorders:

Ulcer of the stomach.

Acute exacerbations in Bright's disease.

Gouty stone or gravel.

Prolonged febrile states.

The daily amount will vary with the disorder and with the amount of movement allowed to the patient. If the sufferer be confined to bed, from 3 to 5 pints of unskimmed milk will suffice, whereas if there be an absence of fever and exercise be permitted, from 7 to 8 pints must be consumed. Half of this latter quantity should be skimmed, for if this precaution be not taken, an excess of fat, in the form of cream, will be consumed. In fever, when the smaller amounts only are taken, skimming is unadvisable.

The following precautions to people undertaking the milk cure are necessary.

The milk allowance for the day should be divided into four parts, and each part should be taken at intervals of four hours, commencing from 8 A. M.

It should not be taken very cold, but should, if necessary, be slightly warmed before it is consumed.

If constipation results, three cups or more of black coffee may be allowed each day. If diarrhœa ensues, and if the cause be not found in a milk too rich in cream, a small quantity of raw-meat essence, directions for the making of which are to be found in every modern invalid cookery-book, must be swallowed each time before the milk is taken.

A diet exclusively of milk must in no case be continued for more than six or eight weeks, but should then be supplemented by other light foods.

Besides its utility in an exclusive dietary, milk possesses, as we all know, a prominent place in almost every

food system, and even vegetarianism has had, at a sacrifice to consistency, to retain this very decidedly animal fluid.

As derivatives of milk I may mention the following:

Whey, rich in salts, has slight nutritive properties, and forms an agreeable drink in febrile states.

Buttermilk, a by-product in the manufacture of butter, is, spite of its sourness, easily tolerated by the stomach and possesses marked nutritive qualities. It forms an excellent, and often advantageously for some days an exclusive, food in severe gastric catarrh.

Peptonized and pancreatized milk may be prepared by the use of the peptonizing powders sold at all large chemists. The process is simple, full directions accompanying the powders. Pancreatized milk is equal to the peptonized in digestibility and is much more agreeable.

Koumiss is the fermented milk of the cow or the mare. This preparation, as well as kephir and galactase, also fermented milks, is of considerable use in all forms of gastric, and in many of intestinal, derangement. It contains, of course, a small proportion of alcohol (2.5 per cent.).

The Grape Régime.—This scarcely demands serious notice at our hands. An analysis of the grape shows that, as an exclusive article of dietary, it cannot possibly for long meet the bodily needs, since the relative quantity of grape-sugar present ranges from 10 to 15 per cent., while that of soluble albuminoids is often as low as 0.6 per cent., and never rises to 1 per cent. As an adjunct to other foods, grapes consumed to the extent of 4 to 6 lbs. a day are useful in certain cases of constipation and of functional kidney failure, for they promote markedly the activity both of the bowel and of the kidney.

We have now come to the end of our study of one important cause of bodily disturbance—a defective food sup-

ply—and we have viewed the subject in the three natural divisions to which it lends itself—viz., defective by deficiency, by excess, or by unsuitability.

So far-reaching, indeed, are the consequences of errors in nutriment, telling, as they do and must, on the whole body, even to its most distant organ, and defiling in the food supply the very sources of all life, growth, maintenance, and movement, that it is no unusual experience to encounter able men who see in food reform the physical, mental, and moral regeneration of mankind. But even if mankind were willing to concede to a physiological diet scale its claim to be "the one thing needful," the physician would find himself often in sore straits when asked to prescribe to each man his proper dietary, and the amount of necessary failure would soon discredit the whole scheme. Man is, unfortunately for the dietetist, a varying quantity, not only as regards himself, but in relation to all other men—the food of to-day is the poison of to-morrow, nay, the food of breakfast is often the poison of dinner. "My dear sir," the dietetist will say, "all difficulties of digestion would disappear in a few years under our system." Unfortunately, unless the whole system of life was simultaneously altered, dyspepsia would not disappear. Grief and sorrow and worry and anxiety, the most potent of all disturbers of the digestive organs, will, like the poor, be with man till the days of the millennium. There is a great deal of good, much more than is recognized by modern medical science, in a wise dietary, but could we even in every case overcome the difficulties in prescribing for each meal of each day, its kind and its limit, we should even then find that disease, vice, and mental failure had not departed from the land.

We are now called on to consider the various disorders that may occur in the digestive process.

CHAPTER X.

DISEASES DUE TO IMPERFECT DIGESTION.

Effects of Failure of Digestion.

Regions where Digestion takes place.

In the mouth there are, practically, no signs of primary failure. It *reflects*, however, owing to its intimate nerve connections, the derangements of the *stomach*.

(*a*) *Mouth.*

Thus in atony of the stomach, the mouth is clean but pale, and the tongue usually clear, but in inflammatory derangements of the organ the mouth is foul and congested, the tongue thickly furred and the taste greatly vitiated.

(*b*) *Stomach.*

(1) Weakness of stomach=atonic dyspepsia, a portion of general muscular or nervous debility.

(2) Inflammatory disorder of stomach = acute or chronic gastric catarrh, the result of overstimulation of the organ, but sometimes due to acute gout.

(3) Degenerative disease of stomach—*e. g.*, cancer or ulcer. Very rare.

(*c*) *Intestines.*

(1) Weakness of intestine, a portion of general want of tone in the body.

(2) Inflammatory disorders, due to irritation.

(3) Degenerative disease—*e. g.*, cancer, ulceration, etc.

(*d*) *Liver* (secondary digestion).

Functional.	*Degenerative.*
Gout.	Cirrhosis of the liver.
Biliousness.	Waxy degeneration of the liver.
Gall stone.	Fatty degeneration of the liver.
Glucosuria (of one kind).	Cancerous degeneration of the liver.
Albuminuria (of one form).	Acute yellow atrophy of the liver, etc.

(*e*) *Tissues* (tertiary digestion).

Obesity.

Rheumatism.

Probably many other ailments but little traced out, as yet.

Treatment.

Of atony of stomach and intestines. Improve general health.

Of inflammatory derangements of stomach and intestines. Remove all sources of irritation, soothe the organs, giving the simplest and lightest foods. Improve general health.

Of degenerative diseases of stomach and intestines. Soothe, and seek, with extreme caution, to nourish.

Of the five functional disorders of the liver. Improve general health. Simplify to the uttermost the dietary. Plenty of exercise and of fresh air.

Of obesity and of rheumatism the treatment must be very specially adapted to each case, but *exercise*, simple dietary, a dry climate, and suitable clothing, will, in all cases, effect much good.

CHAPTER X.

DISEASES DUE TO IMPERFECT DIGESTION.

Let us epitomize the digestive processes.

The *alimentary canal*, by which is understood that tube of varying calibre which extends from the mouth to the termination of the bowel, is the seat of the first rough assortment of food, which I call *primary digestion.*

This first process of digestion is an exceedingly simple one. The food excites the various parts of the canal, with which it comes in contact, to excrete—*i. e.*, pour out—fluids, which have the power of compelling each molecule of the food upon which they can act to take up an extra molecule of water, this sufficing to convert the insoluble colloids, fat, albumen, and starch into soluble crystalloid forms, which are capable of passing through the walls of the stomach and intestine, or of being what is called *absorbed*, simply because they are endowed with a property common to all crystalloids, a power to pass through animal membranes.

The various digestive fluids are prepared, by special glands in the mouth, stomach, and intestine, from the blood circulating around them, each fluid containing one or more special constituents or ferments, by means of which it effects the metamorphosis of colloids into crystalloids.

In the mouth the ferment (ptyalin) in the saliva digests starch only.

In the stomach the ferment (pepsin) in the gastric juice has power only over albumen.

In the bowel are poured out three ferments prepared by the pancreas (amylopsin, trypsin, and steapsin), which digest all three articles of food, starch, fat, and albumen. Bile emulsionizes fat. Finally, the smaller intestinal glands pour out an admixture of digestive fluids similar to those of the pancreas.

It is thus evident that such foods as escape digestion in the mouth and stomach may be converted into crystalloids in the bowel, and thus be utilized as nutriments.

The whole of the alimentary canal secretes the lubricator, mucus.

Spite of the gauntlet which all food must thus run in its passage through the body, much material, from one cause or another, escapes the digestive processes. This so-called waste itself plays an important *rôle* in the economy, for it stimulates the bowel wall and keeps it in constant movement, preventing thus undue accumulations of material in any part of the course, presenting each part of the contents equally to the digestive fluids, and finally expelling the undigested residue from the body.

It must also be understood that the muscles of the mouth which move the jaws and which push the food between the teeth, for the tongue is only a double muscle worked by muscles, and those that, set in the walls of the stomach and intestine, first rotate and then push onwards the contents of those organs, play a very important part in the digestive process, and one which, if deranged, will, in the face of the most perfect supply of digestive fluid, completely upset the digestive procedures.

Such is primary digestion.

Secondary digestion takes up the food at its moment of absorption, and carries it through the liver into the general circulation.

Fat, as we know, does not pass through this organ at all, but through the abdominal lymphatic ducts and glands, undergoing therein some probable, but unknown, change, and issuing thence into the general circulation.

The foods going to the liver are, therefore, now represented by grape-sugar and by soluble albumen, which lose somewhere—probably in their passage through the intestinal wall—that extra molecule of water by virtue of which they became crystalloids, and, carried swiftly by the portal vein to the liver, encounter therein, in the guise of cells, new animal membranes which speedily arrest their onward course.

We have thus grape-sugar, now called glycogen or animal starch, and albumen, both as colloids, lodged in the liver. What shall frank them through this gate placed at the entry of the general blood-stream?

The arterial blood in the hepatic artery. We know that the liver is the only bodily organ with two blood supplies. One, a large one, the portal vein bringing food; the other, a small one, the hepatic artery bringing arterial blood to nourish the organ. Now, all arterial blood contains two ferments, which have the powers respectively to convert starch to grape-sugar, and insoluble to soluble albumen.

Thus, while *intermittently—i. e.*, after each meal—the portal vein brings to the liver large fresh supplies of insoluble glycogen and albumen, the hepatic artery, *constantly*, but in small amounts, brings blood that can digest once more to grape-sugar and soluble albumen those materials.

By this simple but perfect plan, while food need only

be taken at intervals, the blood-stream of the body is constantly supplied with the small quantities of fuel (grape-sugar) and tissue-repair material (soluble albumen or blood plasma) which it needs to keep life going in an even and systematic manner.

Not *all* the albumen, however, passes on thus; some is burned in the liver into urea, and some is converted to bile acids.

Tertiary digestion takes up the running where the secondary process leaves it, and concerns itself with the final destiny of the grape-sugar and the soluble albumen in the blood-stream.

The grape-sugar, and the fat which it now meets again in the general blood-stream, are carried off to the body cells, and *there* are burned by the aid of the oxygen drawn in by the lungs; the albumen, travelling to the same destiny, undergoes a partial oxidation there, supplying, in addition, each cell with material with which to interact.

Now let us turn to the derangements of this triple process.

I. DISORDERS OF PRIMARY DIGESTION—

i. e., of those occurring in the alimentary canal.

For purposes of study, and because such division is founded on physiological grounds, the alimentary canal may be viewed as consisting of two parts; the first including the mouth and the stomach, the second only the intestine.

Derangements of Mouth and Stomach.

The connection between these two organs, spite of the space separating them and their distinct digestive functions, is a very close one, so intimate indeed that the one organ may be justly viewed as a direct continuation of

the other. Of the two, the stomach plays the leading part, calling the tune, so to speak, in all derangement; the mouth obediently following, and reflecting on its surface the gastric states. This perfect interaction, I need scarcely say, is brought about by means of the nervous system.

We will, therefore, discuss indigestion as seen in the stomach, referring, when necessary, to the secondary states thereby induced in the mouth.

The stomach functions may become deranged, like those of every other organ in the body, as a result of weakness, inflammation, or degeneration.

(*a*) **Gastric Derangement, the result of Debility,** the **Atonic Dyspepsia** of the text-books.

This is not a disease at all, nor is it a localized state, but springs from a general debility of the muscular and nervous systems common to the whole body.

Not the stomach or mouth alone, but the whole alimentary canal, share, therefore, in the debility. Now, we know that the mouth, stomach, and intestine are all provided with muscles which by their contraction distinctly aid the digestive process, and since the food excites the stomach and intestine to muscular action and to secretion, and can do so only by the agency of the reflex nerves, it is clear that where we have a state of muscular and nervous failure, we must, at the same time, also have marked digestive incapacity.

The sufferers from atonic dyspepsia are, then, the aged and the feeble.

The symptoms are: *defective digestion; undue retention,* and consequent *fermentation of food* in the stomach and intestine; *pain* from the development of gas (wind), and the *distension* with it of the flabby, non-resisting stomach and intestinal coils; *constipation,* alternating with *diar-*

rhœa, the latter set up by the irritating products of fermentation.

The line of treatment is plain. The food, in the first place, must be cut down to the low level of the digestive capacity; must consist of material not apt to undergo rapid fermentation; and must, in addition, contain plenty of waste to stimulate the stomach and intestine to action. Fruit, milk, porridges, brown bread, vegetables (except potatoes), fish, oysters, game, chicken, and well-kept mutton are the most suitable articles, but must be taken in small quantities. Natural white wines, cider, light beer, coffee, and decoction of cocoa-nibs are the best beverages.

In the second place, the *whole* muscular and nervous tone of the body must be improved; and as this end is gradually secured, the amount of daily food may be correspondingly increased, both in amount and variety. Massage, by its system of passive exercise, combined with forced feeding, can cure many sufferers from atonic dyspepsia; but my experience of some into whose hands this simple method of cure has often fallen would lead me to be exceedingly chary of recommending it. In any case, massage is an artificial as well as an expensive means of cure, and can, therefore, but in exceptional cases, be had recourse to.

The restoration of muscular and nervous tone in cases where such restoration is possible, which it manifestly is not in the very aged, must be resolutely undertaken. All fears of evil consequences from exercise, etc., must be resolutely discarded, and this is a necessary word of advice, for, particularly in the female sex, there exist certain misplacements upon which great stress is laid, and for the relief of which rest is often recommended, when, in reality, the vast majority of these disorders is due simply

to lack of tone, and can be cured only by a gradual elevation of health and improvement of muscular tone. Three things have damaged the female constitution: defective muscular exercise and feeding in youth, the nature of the clothing worn, and the attentions of the gynæcologist. An excellent and most sensible book, entitled "Health, Beauty, and the Toilet," by the late Dr. Anna Kingsford, gives, better than I can, all necessary directions for a rational, light, muscle-freeing style of female apparel, which delicate ladies cannot do better than to carry out.

Whatever the sex of the sufferer from atonic dyspepsia, the first step should be to consult a skilled and unprejudiced medical man, who is likely to give the case a patient and impartial hearing. By such a plan, every allowance will be made for the special conditions present. It is worse than useless to pin one's faith to one nostrum, dietetic or other. Vegetarianism is often, for example, an excellent food system in these cases; but many precautions are necessary for those, especially if feeble, who undertake it.

The removal of all deleterious habits, the infusion into life of a something to vary monotony and to stimulate to exertion of the mind, physical exercise, graded to the strength of the individual—all these are necessary, and, in conjunction with a sufficient but wisely selected dietary. cannot, in the vast majority of cases, fail to effect a cure.

The great bar to success is often a strange mental torpor or a morbid irritability, opponents to be defeated not by the sheer force of will in the medical adviser, but rather by circumvention and tact. A man may be as easily tempted by sufficient inducement to a wholesome as to an unwholesome life. Hygiene may take a leaf from the tempter of man. It also may show the sufferer figuratively the kingdoms of the world, and add, "All these things will I give, if you will fall down and worship me."

We may fittingly conclude this subject with a colloquy between the eminent physician, Sir W. Clarke, and a lady patient. "The old-fashioned way of working, rather with our own hands than by proxy," said the doctor, "is the best of tonics; put on brown holland aprons and help in the house two or three hours a day." "But that is not the fashion," replied the mother. "No fault of mine," said the doctor, "you cannot cheat Nature; man is a machine made for motion, not for idleness; what you disdain with your hands falls on your nerves; if you refuse Nature's tonics, you must take mine—a very poor substitute, I can assure you."

This class of patients will often request physic; it is in keeping with the state of their minds to choose the less laborious course, and medicine seems to offer a royal road to health. This, of course, is a delusion. Those slow stimulants, euphemistically called tonics, are the usurers of Nature. If they make an advance, it is but for a brief period and at ruinous rates. An elixir of life—for such a *real* tonic would be—is as great a physical absurdity, as idle a dream, as the philosopher's stone.

To administer any form of physic in atony of the alimentary track is, then, a mistake. It does no good, and distracts often the patient's attention from the one thing needful—an altered mode of life. At the outside, an occasional and mild purgative to clear out fermenting foods is all that should be attempted.

The state of the tongue in atonic digestion is clean, or nearly so; the gums are generally sound, often pale, the preservation of the teeth fair. The throat is pallid and generally relaxed, the uvula often dependent.

(*b*) **Gastric Derangement the result of Inflammation.**—This class of derangement offers a strong contrast to the one just discussed. That was *not* a disease and was gen-

eral ; this is a decided disease, and is as nearly local as a disease can be.

Atonic digestion was a mere state *in perfect harmony with the rest of the body*, and only comes to be regarded as a local disorder because the patient fails to take in the whole situation. In inflammatory disorder we have, as cause, a localized over-stimulation, leading, in the first instance, to local excitation, and ending, if the pernicious cause be maintained in action, in hopeless bankruptcy of the part.

All inflammatory processes may be either acute or chronic. We must therefore deal with our subject under the two divisions of *acute* and *chronic gastric inflammatory disorder*, using, for the sake of brevity, and to avoid confusion in the mind of the reader, the usual terms **Acute** and **Chronic Gastric Catarrh.**

The Acute Form of Gastric Catarrh.

Its causes are to be sought in excessive stimulation of the stomach, and this may be brought about by one of three causes. The first and most common is alcoholic excess ; the next in frequency, irritation of the surface of the stomach, the result of some irritant poison in the blood, usually gout poison, but other poisons, notably fever poisons, have a like effect ; the least common cause of all is an habitual excess in food.

The heavy drinker is the common subject of this disorder. His so-called biliousness is simply gastric catarrh, the sour mucus ejected being mistaken for bile. The attack follows, and is clearly traceable to a recent debauch. If gout be the cause, the attack is, to some extent, periodic, and takes the place of inflammation of the joint of the big toe or other part. In these cases the attack is excited, not caused, by some very trifling dietetic excess.

As a consequence of mere gluttony, gastric catarrh is rare.

The symptoms are readily recognized, and the cause of their appearance is easily traced. Ordinary stimulation of the stomach produces an excretion of gastric juice and of mucus in necessary quantity, and sets up slow and regular muscular contraction in the organ. Excessive stimulation produces, as a natural result, phenomena of the same class, but, in proportion to the stimulation, excessive.

We witness, then, in acute gastric catarrh, these local signs of derangement: first of all, *acidity;* secondly, *indigestion*, the result of the presence of *large quantities of mucus, fermented by the heat of the stomach*, and which coats all swallowed food; thirdly, *pain and vomiting*, the consequence of the excited muscular sensitiveness and activity. There is furthermore present a *sensation of internal heat*, which tempts the sufferer to desire cooling fluids. These symptoms are accompanied by more or less of *fever*. The severity and duration of the attack varies. Usually in twenty-four hours the vomiting ceases and the pain lessens—in short, the local inflammation subsides. At the same time, the long list of secondary discomforts, *headache, giddiness, feverishness, despondency*, etc., improve, but generally a week elapses ere recovery can be called perfect.

In acute gastric catarrh, the mouth indicates clearly the state of gastric disorder present. *The tongue is thickly furred*, the gums and throat are *reddened*, the teeth are *coated with mucus*, the breath is *hot and foul.*

Acute gastric catarrh is sometimes spoken of as gastric fever, and though the term is a bad one, inasmuch as it is often also employed to designate typhoid fever, yet it is correct in one way, as indicating that this very common variety of stomach derangement is attended by many of the symptoms which characterize the onset of specific fevers.

The treatment of acute gastric catarrh is as follows :

1. *Rest* the stomach. In bad cases stop *all* supplies of food for twenty-four hours, allowing during that space nothing but ice, or effervescing alkaline waters in small doses. Then commence very cautiously to feed the patient, beginning with the lightest and simplest articles. Koumiss, Benger's farinaceous food, Nestlé's, Ridge's, or other invalid foods, the simpler the better, barley water, rice water, whey, etc., or a meat essence, such as Brand's, quite free from fat, may be tried. From these, and such as these, must the selection be made. In step with a subsidence of the attack, an advance may be made to fruits, white fish, oysters, farinaceous puddings, soups, etc., till an ordinary diet is at last reached.

Buttermilk, as a sole article of food for the first four or five days, succeeds, in some cases, admirably.

2. *Soothe* the inflamed stomach.

To this end the organ must first be emptied by a full draught of warm water, which is usually sufficient to excite emesis. This course may be followed by the administration of a mild purgative, and by the application of a mustard plaster over the stomach, the precise region being easily discoverable by its tenderness on pressure.

Then, in trisnitrate of bismuth, we possess an excellent drug that combines in itself all the great marks of a good medicinal agent, for its action is restricted to the part to which it is applied, and, being insoluble, or nearly so, in the juices of the body, it has no secondary and undesirable influences.

An ounce of it may be bought, and as much as will lie on a sixpence may be placed on the tongue and washed down with a few mouthfuls of soda water, every two or three hours, till all nausea and pain subside.

Rest and quiet are essentials, in bad cases, to a speedy cure.

I must caution the reader against a pitfall. If the sufferer be an alcoholic, he will probably, during the attack, try a little alcohol, and will retain it at a time when everything else is vomited. The friends, alarmed at the rejection of all other substance, will petition that the alcoholic indulgence be sanctioned. This request must not be granted, or the attack will be indefinitely prolonged.

The Chronic Form of Gastric Catarrh.

This is not by any means, as we might conjecture, a necessary and invariable consequence of repeated attacks of the acute variety. A gouty man, or one given to only *occasional* alcoholic excess, may experience in the course of his lifetime many dozens of even severe attacks of acute gastric catarrh, and yet, inasmuch as time for recovery is allowed between each attack, he may never become a sufferer from the chronic form of the malady, at least not to a troublesome degree. It is the man who regularly, systematically, abuses his stomach, who is in the habit of keeping himself up by frequent imbibitions of alcohol, often taken on an empty stomach, who becomes most surely a victim.

Let us trace the genesis, and then enumerate the symptoms, of chronic gastric catarrh.

Throughout the body there is everywhere disposed, for use mainly as a binding material, a substance called fibrous tissue, which enters largely into the construction of the stomach — as it does into that of the liver and kidneys — acting as a support to the glands, which, studded all over the surface of the stomach, prepare from the blood, and supply for use in digesting albuminoid food, the gastric juice. The effects of stimulation of this fibrous material are everywhere the same. First, it swells, and after this swelling has been maintained for some time—often for

years—it begins slowly to contract, this contraction necessarily involving the strangulation of the tissues which it surrounds. There is no relief from this process when once it has become established; the advance of it may be rendered more slow by judicious means, but it cannot be arrested. It is the degeneration, the death approach, of the tissue, and is a normal phenomenon when seen in the aged.

The results, then, of chronic stimulation of the lining of the stomach are easy to forecast. The glands become gradually constricted and rendered useless, and the supply of digestive fluid is cut off. The small blood-vessels suffer in a like manner, but to a less extent; least of all, and last of all, are the mucous glands affected.

The stomach of a sufferer from this variety of disorder presents, as a matter of fact, when viewed after death, or during life by means of the endoscope, the following characteristic appearance: The surface is a dusky gray, a result of the diminished blood supply, is covered with a film of mucus, usually in a state of decomposition, the gastric juice (if food be present to excite its secretion, for an empty stomach contains none) is defective in quantity and quality. The muscular power of the stomach may be, but often is not, much impaired.

The symptoms complained of by the sufferer, the causation of which is now clear to us, are in general terms as follows: *Morning nausea* or sickness, with ejection of "phlegm" from the stomach, followed by relief and by some hunger; *defective appetite and taste; pain after the consumption of solid food, flatulence,* and *marked thirst.*

The condition of the mouth reflects the state of the stomach. The tongue is always furred, never clean; the throat is always congested; the breath is foul; the teeth,

unless scrupulous care is taken of them, are coated with mucus and with deposits of tartar.

The treatment of this condition can only be palliative.

All injudicious stimulation of the stomach must cease, only a little alcohol being allowed at meal times, if essential to necessary digestion.

The food must be of the simplest form, and of the kind least likely to ferment. Fats must, to a large extent, be shunned. The general health must be raised.

As regards medication, no drug, except bismuth, affords much relief (see Formula No. 6 in Appendix), and its use may be continued, at intervals, for years, without harm. Fresh and dry vegetable charcoal and the black oxide of manganese are sometimes useful, but are inferior to bismuth, and considerably more objectionable as constant medicines, being moreover gritty and unpalatable. When constipation and flatulence are sources of trouble the bismuth may, for a day or two, be combined with rhubarb, soda, and oil of peppermint (see Formula No. 7, Appendix).

(*c*) **Indigestion due to Degenerations of the Stomach.**—In chronic gastric catarrh we have witnessed one variety of degeneration, the result of long-standing inflammation; there are two other, fairly common, forms, which, in a popular work, it will be my duty only to mention, since neither of them can rightly become a subject for self-treatment. These are **Ulcer of the Stomach** and **Cancer of the Stomach.**

The existence of the former of these complaints may be suspected when, with signs of *acute indigestion*, *vomiting* of bright red blood is from time to time witnessed, a symptom which is rare in other conditions than this. It is worthy also of notice that in the female sex ulcer of the stomach is of commoner occurrence than in males, and that it selects almost exclusively female domestics between eigh-

teen and thirty years of age.* In the male it is not only comparatively rare, but the average age at which it occurs is also much higher, generally between fifty and sixty years, and the employment followed is usually one which involves sustained pressure on the gastric region. Shoemakers and clerks are thus common sufferers.

Cancer of the Stomach is a disorder so grave, so rapidly progressive, and so invariably fatal, that if I mention a few of its prominent symptoms it is only to prevent the hypochondriacal dyspeptic from imagining himself the subject thereof. It is rare under fifty years of age; its onset is severe; its progress unchecked; its symptoms every day more alarming. *Severe dyspepsia* is generally the first symptom. *Loss of flesh* is early noticeable; and *vomiting*, after the first month or two, becomes almost incessant and is characterized by the appearance of a substance like *coffee-ground*, due to blood altered in appearance by the gastric juice. Two years of life is the utmost that may be expected for the subject of gastric cancer, the vast majority of sufferers dying within a twelvemonth.

Dilatation of the Stomach is an occasional sequence of gastric ulcer, and may be caused by contraction of the pyloric orifice of the stomach, or by adhesion of the stomach to the intestines or to the liver, and consequent fixation of the organ, all of which are not uncommon sequences of gastric ulcer.

Derangements of the Intestine.

We now pass to the disorders of that portion of the alimentary track which lies beyond the stomach.

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* There is some reason to think that this may be due to the pressure of corset bones on a stomach slightly congested by a diet richer than, or different to, that to which the stomach has been hitherto accustomed.

Like those which we have just reviewed, these may be the result of mere lack of tone, of inflammatory processes, or of degeneration.

The diagnosis of intestinal disorders is by no means so easy as that of analogous processes in the stomach, for no search light can penetrate to the seats of disorder, and no sample of the digestive juices can be procured. Furthermore, gastric derangement, by involving imperfect digestion of food, is often the sole cause of the symptoms set up in the further reaches of the alimentary canal, and may thus lead to a suspicion of intestinal mischief which does not exist.

(*a*) **Intestinal Derangement, resulting from Loss of Tone.**—Lack of tone, like the analogous state in the stomach, is not, in the ordinary sense of the word, a disease, but takes its rise in a loss of muscular power, usually general to the whole body. It may be merely transitory, due to some temporary cause that induces feebleness, or it may be a characteristic of the individual and last a whole lifetime, as we see in many females, or may be a perfectly normal phenomenon of old age.

Like the stomach, the intestine is provided throughout its whole extent with a muscular wall which plays an important part in the work of alimentation, by turning over and presenting alternatively to the digestive fluids each part of its liquid contents, while at the same time urging the whole mass towards the outlet.

It is not hard to guess the consequences of a deficiency in this muscular power. In the first place, there will be *defective digestion* accompanied by some *fermentation* and a consequent *development of gas;* and in the second place, unless the fermenting food irritates powerfully the intestinal wall, there will also be *constipation.*

In conjunction with this loss of muscular tone there will

often be found, though it does not of necessity follow, some concurrent deficiency in quantity and quality of the intestinal juices, a defective secretion of bile, of pancreatic fluid, and of the secretion of the intestinal glands; but, as the class of sufferers from loss of tone are usually very small eaters, this lack of digestive fluids is but rarely to be reckoned as a large factor in the trouble.

The aged, and the more delicate of the female sex, furnish us with the best examples of this atonic intestinal dyspepsia. Their principal complaint is often of flatulence, the intestinal gas either remaining stationary in one coil of dilated bowel, and producing pain, or rolling, with much noise, from one part of the large intestine (the colon) to another. It is needless to say that nothing but lack of muscular tone can account for the permanence of such a symptom.

The treatment is simple, and, when resolutely carried out, always successful. If in old age be found the cause, attempts to improve the condition by such drugs as strychnia and nux vomica are not only unreasonable, but must, in the long run, render matters worse. Attention is to be directed mainly to the food. This should consist of nutritive material containing much waste, and therefore a full measure of stimulating power. To the vegetable world we may mainly look for such food. Brown bread, porridges of coarse meal, fruit, vegetables of every digestible sort—from which sometimes the members of the cabbage tribe have to be excluded—should occupy an important place in the dietary. These will not only rouse in a wholesome and unobjectionable manner the muscular function of the bowel, but do not themselves contain any material capable of undergoing rapid fermentation. Plenty of fat bacon, and bacon from its fatness is scarcely to be reckoned as a meat, may be allowed for breakfast, and a little fish,

poultry, or game at dinner; otherwise the food should be vegetarian in character, excepting that cream, fresh butter, and milk, if they agree well, may be allowed. Coffee is the best beverage for breakfast; white wine, sound cider, light ale, or diluted whisky for dinner.

Reasonable exercise and all other necessary means for the maintenance of a fair state of general health should be sought after.

It is but rarely, when such treatment is conscientiously undertaken by the patient, that recourse need be had to medication. In any case nothing more than one of the very excellent flexible Cascara capsules of Duncan & Flockhart, of Edinburgh, need be taken, after dinner, every second or third day.

It is well to remember that, in old age, a daily evacuation of the bowel, on a rational dietary, is not essential to health.

When the sufferer is a lady not beyond middle life, or a delicate, sedentary man, the rational aim in treatment is the re-establishment of that muscular tone which belongs, of right, to the pre-degeneration periods of life.

The commonest type of sufferer is the well-to-do lady, often under thirty, and quite unused to muscular exertion. Her treatment hitherto has probably been confined to the avoidance of tea, frequent change of air and scene, an occasional mild aperient and tonic, various small alterations in her dietary, and perhaps an occasional visit to some spa or watering-place.

The net result of such a line of treatment has been *nil;* temporary improvement having always given place to relapse.

The following is the only plan on which a permanent cure can be expected:

Both the muscular and nervous systems must be strength-

ened, for though the muscles store the energy, the nerves discharge it, and are concerned, therefore, equally in the cure. Active muscular exercise must be taken, and to render this possible some brief alterations in the patient's ordinary apparel are generally called for. Every constriction of the body that interferes with the freest movement of the muscles must be removed, and the weight of the garments worn should be reduced to the lowest level consistent with health and the reasonable demands of fashion, while even this modified burden must be distributed as evenly over the body as possible.

With reference to one article of attire, the corset, much that is antagonistic to the canons of common-sense has been written and spoken. It is neither necessary, and plainly it is not possible, to abolish this garment, as the medical journals and the one-idea men would have us attempt. It should be treated as the Fathers of the Society of Jesus are, correctly or incorrectly, said to have done the Chinese idols, tenderly and cautiously, with a view to the gradual removal of its objectionable features.

For practical hints on this and kindred subjects, I must again refer the reader to the useful book by Dr. Anna Kingsford, entitled "Health, Beauty, and the Toilet."

Having seen, then, that the clothing shall form no bar to muscular movement, exercise must be resolutely undertaken. Swimming, riding, rowing, cycling, tennis, skating, each and every form of exercise that brings the individual into contact with fresh air and fresh faces, that rouses the mind as well as the body, must, according to the circumstances present, be indulged in. The special weaknesses of females, which are supposed to require, for their alleviation, rest and quiet, may in all but very exceptional cases be disregarded. They are the *consequences* of a generally relaxed and debilitated muscular system,

and are to be *cured* only by an all-round elevation of tone. Rest alleviates present discomfort only, while indefinitely postponing all hope of a cure.

Of course the exertion taken must, at first, be comparatively little, for exercise pushed to the extreme fatigue point becomes itself enervating. It must be commenced cautiously and gradually increased.

In some few cases passive exercise, such as massage, may, in the absence of sufficient resolution on the part of the patient, be at first substituted for other forms.

(*b*) **Intestinal Derangement, the result of Inflammatory Processes.**—It cannot with accuracy be said that inflammatory disorders in the intestine, analogous to those so common in the region of the stomach, are very often met with, for the bowel is evidently not so subject as is the latter organ to direct and powerful stimulation.

Sometimes, indeed, gastric catarrh will extend beyond the stomach for some little distance into the bowel, but even then such extension can only be surmised from the appearance of mild jaundice, the result of swelling of the intestinal mucous membrane at that point where the bile makes its exit.

Indeed, general, acute, and severe catarrh of the bowel linings, except in that rare complaint, enteritis, may be said to be unknown, though a mild and subacute form of it must be set up every time that acrid products of fermentations pass the stomach and excite the intestine to those violent and painful contractions which terminate in the expulsion of the offending mass.

But a **chronic state of Intestinal Catarrh** is by no means unfrequent, especially in scrofulous and badly fed children. Such pass large quantities of mucus, and with it not unfrequently thousands of thread-worms, which find in such mucus a convenient habitat, both these and the less com-

mon but much larger round worm rarely locating themselves in healthy subjects. These parasites are to be viewed as sequences, not antecedents and causes, of intestinal disorder. The case of tape-worm is, however, among intestinal parasites, an exception, for it requires no such special preparation for its reception, but will affix itself in the healthiest intestine.

The prominent symptom, often indeed the only outward and visible proof to the laity, of the existence of inflammatory bowel disorder, is diarrhœa, a very natural consequence of the outpouring of fluid which ensues on intestinal irritation, though in saying this I must add the caution that diarrhœa is much more often due to faulty digestion in the region of the stomach than to the existence of any special primary intestinal disorder.

The treatment is again very clear. The bowel must first be emptied of all irritating products by some very simple aperient, not itself an irritant, and castor oil is the only drug. There are several ways in which the administration of this medicine may be made easy for delicate stomachs (*vide* Appendix, Formula No. 9).

Then the bowel must be soothed and, as far as possible, rested. This is only to be done by a wise selection of food. Bland but nourishing liquids, and these only in the smallest quantity, should be taken. Brand's essence, Valentine's meat-juice, Benger's meat preparations, etc., are to be commended. These undergo probably almost perfect absorption in the stomach. Light meat jellies may also be allowed, also oysters. Barley water, rice water, whey, and solutions of malt extract (*i. e.*, grape-sugar) may be allowed, and all contain some nutrient properties. Milk is often well avoided, but sour buttermilk and koumiss may generally be allowed. A light, dry, sparkling wine, preferably red, or even a little very dilute spirit, is

permissible in cases where the stomach is quite sound, but malt liquors, cider, sweet wines, and coffee must be shunned. Rest in bed in a well-warmed room is a great adjunct to treatment, and helps to prevent considerably the loss of weight and muscular power which might otherwise ensue on a restricted dietary.

Among drugs, few are of any service except castor oil, which, in small doses of one to three teaspoonfuls, may be administered every second or third day. In a few cases opium must be had recourse to. Then the opium tabloids of Burroughs & Welcome (two drops of laudanum in each tabloid) make a palatable method of giving the drug, and an adult may consume from five to ten of such tabloids per diem. They should never be given to children.

On recovery, the return to a full, mixed diet must be cautious and gradual.

(*c*) **Intestinal Derangement, the result of Degeneration.**—Of these there are unfortunately several, which, as they are unsuited to a course of self-medication, I shall only lightly touch upon.

Cancer of the Bowel is rare under forty years of age, and may affect any part of its course. The symptoms vary according to the site, but are severe and progressive. The tumor to which this malignant process gives rise may generally be felt, even early in the case, by careful manipulation.

Ulceration of the Bowel may occur in various forms.

When seen in that part of the intestine called the duodenum, which is the immediate continuation of the stomach, the ulcer is single and often large and ragged. The rationale of its causation is obscure, but it is not an uncommon sequence of extensive burns on any part of the surface of the body.

In other portions of the intestine ulceration may be sin-

gle, and is then generally produced by the presence and pressure of some foreign body, such as a gall stone; but in the vast majority of cases it is multiple, and due to a general blood derangement and consequent breakdown of intestinal glands. Examples of this we see in *typhoid fever*, in *tuberculosis*, and in *syphilis*. In *severe dysentery* multiple ulceration, consequent on severe inflammation of the coats of the large bowel, is present, and renders the treatment prolonged and often unsuccessful.

II. DISORDERS OF SECONDARY DIGESTION.

Secondary digestion carries the food from the point of its absorption by the alimentary canal to its exit through the liver into the general blood-stream.

Hitherto our foods have been three in character—albumen, starch or sugar, and fat; we may now eliminate the last named of these, as it does not pass through the liver, but follows a separate course of its own into the general blood-stream.

Absorbed albumen and sugar (for starch and cane-sugar are now represented by the one substance, grape-sugar) travelling by the portal vein, reach the liver, and there undergo a species of arrest, most durable and marked in the case of sugar, less so in that of albumen.

These arrested substances—now in the forms of insoluble albumen and animal starch or glycogen—undergo a re-digestion at the hands of the blood brought in a small stream to the liver by the hepatic artery.

The glycogen is by this process *slowly* reconverted to grape-sugar, in which form it passes the liver by the one channel of exit, the hepatic vein, and flows onward, unchecked, to the heart. The albumen has to submit to a more complex change; much of it is oxidized to urea by the oxygen in the blood of the hepatic artery, a second

portion is cast off, mixed with excreta from the hepatic artery, as bile, while one part only is reconverted to soluble albumen and becomes blood serum, and with the grape-sugar passes by way of the hepatic vein on towards that great arterial pump, the heart.

It is now clear that disorders of secondary digestion must depend almost exclusively both on the character and on the amount of the blood supplied by the hepatic artery.

Suppose, now, that the supply of this fluid be, from any cause, excessive—what then? We shall evidently have an excess of grape-sugar, quite beyond the combustion powers of the body, poured into the hepatic vein, and such excess of grape-sugar will run off by the kidneys, exciting them to over-action, and, as it can pass out only in a state of solution, it will necessarily rob the blood of much water.

It is clear that, in such a state of matters, there will be a *constant hunger*, an *incessant demand for more and more cane-sugar and starch* to fill the place of that so lavishly converted to grape-sugar by the liver. There will also be *great dryness* of the skin of the body, for the blood will extract fluid from the tissues to make up for its loss of water; finally, there will be *considerable thirst*. But there will be other symptoms, for the whole body will suffer, the incessant eating and drinking will soon overtax the digestive powers of the stomach and lead to their failure, and on this will ensue failure of general nutrition, and, towards the end, *consumption*, attacking the lungs, which are called on to supply from the air oxygen in excess of the ordinary amount.

Such are the principal sequences of an excessive pouring into the liver of arterial blood by the hepatic artery. Now, supposing that the cause of such over-supply be

some permanent and incurable paralysis of the nerve which should keep the minute offshoots of the hepatic artery contracted, the sequence of events sketched will persist, and the patient will die of **diabetes mellitus**; but supposing, as is more often the case, that a mere *temporary* overpressure exists in the hepatic artery, then again we shall have the group of phenomena which must still go by the same name—*i. e.*, diabetes mellitus—but the disorder is transient and probably curable.

Thus, **Glucosuria**—*i. e.*, **Diabetes mellitus**—which may be either a grave and permanent or a trivial and transient disorder, is a direct consequence of failure of secondary digestion.

But what will be the effects on albumen of an excess of this hepatic arterial blood supply? Surely an excess of albumen in the blood, some of which, as in the case of grape-sugar, may travel away by the kidneys—in other words, we have a common and not formidable variety of *albuminuria*, together with some temporary excess of urea and of bile in the urine.

But suppose, as a consequence of general inaction, or of some poison—such as lead—in the general blood-stream, that the blood in the hepatic artery be poor in oxygen or actually contaminated—what then? Evidently there will be a defective formation of serum albumen, and an excess of albumen will be left in the liver to undergo combustion to urea and change into bile acids. But if the oxygen supply be defective, how is urea—a product of oxidized albumen—to be efficiently made? Some urea will be formed, and an imperfectly oxidized form of urea—uric acid—will accompany it, and, escaping into the general blood-stream, will set up, if the kidneys be not active enough to eliminate it rapidly, **Gout.** But the excess of albumen need not go to form uric acid; it may, under

some conditions, be changed to bile acids, and these, if in excess, will clog* the liver and produce **Biliousness.** And the blood in the hepatic artery assists also in bile formation, and, if impure, will itself be a direct cause of biliary derangement; thus it may cast out such poisons as lead and arrest bile-flow and lead to the same disorder (*i. e.*, **Biliousness**), or it may cast out in excess a very peculiar substance, supposed to be the result of nerve waste, and called cholesterin, and then, in addition to biliousness, we shall have bile sand, bile gravel, or **Gall stones** produced.

But, in an earlier chapter, we have seen that an excessive supply of albumen to the liver may also lead to gout and biliousness (and even to rheumatism), and now we understand clearly why gout, biliousness, and one variety of albuminuria may be due to one of two apparently very diverse causes, either to faults of excess in the food or to defects in the general arterial blood-stream, telling, as such must tell, by way of the hepatic artery, on the functions of the liver. There are wiseacres, yet in the flesh, who wonder how lead poisoning can cause gout and biliousness, and why great nervous depression, or worry, may also tend to the same derangement, and puzzle over the solution of a problem which modern elementary physiology, plus a little easy thought, renders clear, even to the least intelligent.

Of the **Degenerative Diseases** of the liver it is not my purpose to treat. Indeed, the principal ones, **Cirrhosis** of the liver and **waxy** and **fatty** degenerations, are rather to be viewed as local indications of a general decline of bodily vigor than as liver disorders, and give rise to no symptoms specially indicative of that arrest of liver function to

*I have explained fully, in a small book entitled "Biliousness," in what way an excess of bile acids will produce this block in the liver.

which they inevitably lead. **Acute yellow Atrophy of the Liver** is a terribly fatal but exceedingly rare disorder of unknown causation; while **Cancer in the Liver** produces swelling, pain, and often abscess-formation, together with abrogation of hepatic functions according to its size and situation.

III. DISORDERS OF TERTIARY DIGESTION.

We now have to deal with the grape-sugar and serum albumen in the blood, and also with the fat which, though by other ways, has found its way also into the same stream.

These three substances, be it remembered, are in soluble form, but, owing to the rapidity of the current and the thickness of the walls of the channels in which they find themselves, they cannot pass out among the tissues, but are swept on to the right side of the heart.

On reaching that organ they are at once pumped to the lungs. Here the red corpuscles of the blood take up a store of oxygen, getting rid of the carbonic acid which caused them to assume in the veins a dark purple shade.

Back from the lungs the foods come to the heart, but this time to the powerful left side of it, whence they are immediately pumped into the arteries, which divide and subdivide, till at last the grape-sugar, fat, and albumen find themselves once more in channels with but a single membranous wall, and moving very leisurely along. At this point, being colloids, they ooze out among the cells, the grape-sugar and fat to undergo combustion and to store the cells with heat-energy, the products of combustion, water and carbonic acid, finding eventually their way back into the blood-stream, while the albumen incorporates itself by chemical action with the cells, supplying

one more step in the march of the cells to death, and producing thereby one more fraction of that complex phenomenon called life.

The cells throw off waste,* which, eventually assuming the form of urea, is pumped by the action of the muscles forward along the lymphatics into the blood-stream and voided with the urine.

What right, may the reader ask, has such a process to be ranked as a third stage of digestion — should it not properly be styled, as it usually is, an assimilation? As far as the grape-sugar and fat are concerned there is no such thing, evidently, as assimilation, while the action of albumen on the cells is a chemical process, purely and simply, a reconversion of crystalloid albumen to a colloid state, therefore more of a digestive process than anything else.

The Disorders of Tertiary Digestion, then, may arise (*a*) from a lack of oxygen in the red-blood corpuscles and a consequent failure in the combustion of grape-sugar and fat; this ends in **Obesity;** or (*b*) from deficient muscular power, leading to the accumulation of waste nitrogenous débris in the muscles and the appearance of uric acid and other kindred compounds in place of urea, and hence to **Rheumatism;** or (*c*) from degeneration or temporary debility of the cells, also ending in the last-mentioned complaint; or, lastly (*d*), from other derangements of the lungs, skin, and kidneys, which are concerned in the final expulsion from the body of the products of tertiary digestion.

Let us now devote a few lines to the treatment of these derangements of secondary and tertiary digestion.

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* This is styled *cell waste* and is the by-product in the chemical process just spoken of.

Treatment of Diabetes.—This will depend entirely on the underlying cause.

If, as is common in the aged, the appearance of grape-sugar in the urine (*i. e.*, the glucosuria) is due to calcification of the arteries, or is traceable to a general rise of arterial pressure consequent on the contraction of degenerating kidneys, or to an over-vigorous heart; and if, moreover, the grape-sugar in the urine leads to excessive urination, to thirst, to a constant craving for food, and to the other symptoms already alluded to as characteristic of severe diabetes, then it will become advisable, in the first place, to *reduce* the amount of carbo-hydrates (*i. e.*, starch and sugar) consumed. Saccharine or glycerine may entirely replace sugar, and the foods most rich in starch—namely, bread, potatoes, and the various farinaceous compounds—may be cut down in amount till the more troublesome symptoms dependent on the presence of excess of grape-sugar in the blood have subsided. A liberal supply of fat must be allowed to replace the lack of carbo-hydrates, while an increase in the albuminous food (all albumen undergoes some combustion, and is therefore, to a slight extent, a fuel-food) and a reasonable amount of unsweetened spirit or of unfortified wine are also, often, measures of utility.

If, however, in this class of diabetic there is present simply a glucosuria unattended by any disturbance of the bodily comfort—and this is the general rule—then it is unnecessary to resort to any dietetic restrictions whatever; or at most to but slight and gradually carried out reductions in the carbo-hydrate foods, any sudden change, such as is too often adopted during the panic which seizes both doctor and invalid when the glucosuria is first discovered, being apt to lead to graver disaster than the symptoms themselves could have induced, if left untreated.

But, perhaps, the largest of the various classes into which diabetics may be divided, comprises the sufferers from some transient form of liver incapacity, such as gout or biliousness—those, in fact, who have inherited livers unable to bear the normal strain. In such as these glucosuria for long periods, or even as a constant symptom, may be found to exist, *but* there is with it no loss of bodily health fairly traceable to it, and there is rarely any excess of urea excreted by the kidney.

In this class, the treatment must be purely hygienic, directed to a general improvement of health, while in free-livers a course of treatment by some aperient mineral water may materially assist a return to the normal state.

Then, lastly, we have the sufferer from the dangerous variety of diabetes, that in which there is not only some grave brain mischief, paralyzing the power of temporary detention possessed by the liver over grape-sugar, but usually also—as proved by the excess of urea which accompanies that of sugar in the urine—other and wider interference with nutritive processes. In this class the patient's outlook is grave ; the younger, the graver. Drugs act, in conjunction with other means, only as palliatives. Of these, opium and one of its derivatives, codeina, are the best, but no reliance on their curative powers is to be encouraged. Every serious effort must be made to maintain or improve the *general* health. Spite of the languor characteristic of the disease, exercise in the open air must be resolutely taken; the skin must, by a daily warm bath, be induced to act freely; the clothing must be light but warm, flannel being worn next the skin to guard against any sudden chill, and, if wealthy, the patient must not be allowed to expose himself to the rigor and variations of temperature characteristic of a Northern winter. As a general rule, it is well to eliminate, as far as is possible,

starch and sugar from the dietary. This last precautionary measure is calculated to relieve the sufferer from the secondary discomforts attendant on the presence of any excess of unburned grape-sugar in the blood and its escape by the kidney. Full dietary tables may be obtained of any large maker of specialties for diabetic sufferers, though the remarks on the success of such dietetic treatment, often interpolated by them, must be accepted *cum grano*, for, as a matter of fact, some sufferers retain their general health better on the ordinary mixed dietary, or even on a dietary specially rich in sugar, than on one nearly devoid of starch and sugar, and the mere disappearance or modification of a symptom—the presence of grape-sugar in urine—must never be put in the balance against the general well-being of the patient. In any case, the nutrition of the patient *must*, if everything else has to stand aside, be kept up, and this, be it remembered, may on a rigid anti-diabetic régime fail, from several causes, among which may be reckoned distaste for the diet, its sameness and comparative expense, and last, but not least, the miscalculation and consequent misdirections of the manufacturers, who assume that all their foods are easily converted to bodily nutriment, when, as a matter of fact, many of the diabetic articles, such as bran and gluten, are, as compared with ordinary wheaten flour, for which they are recommended as substitutes, but indifferently digested and absorbed.

The treatment of that form of albuminuria which is traceable to liver derangement consists in taking much exercise and limiting the consumption of food to the needs of the body.

In *gall stone*, again, the same directions are all that can be given. The general health must be improved, and all sources of worry and anxiety be, as far as is possible, ban-

ished. During the passage to the bowel of one of these concretions the extreme pain usually, but not invariably, produced, must be alleviated by hot external applications and by opiates internally. The vomiting often set up during this stage is not to be checked, being of great use in assisting onwards the passage of the stone and relaxing the muscular spasm of the tube in which it is situated. When there is good reason to believe that many of these stones are contained in the gall-bladder, an operation for their removal is the safest and best course to recommend.

Salicylic acid, from its power of increasing the watery constituents of the bile, has been recommended as a preventive of gall-stone formation. It is unnecessary to say that this property is soon lost, and the liver is left in a worse state than before the administration of the drug. Nevertheless, sometimes for a few days, when the presence of grit or of small stone in the minuter tubules of the liver is suspected, this drug may be given. In the Appendix I have given a useful formula (No. 11) for its administration.

We have already, in Chapter VIII., fully dealt with the treatment of gout, biliousness, rheumatism, and obesity, all of which may result from a simple excess of food, as well as from the failure of an unusually weak liver in the presence of a normal, or even a sub-normal, supply of nourishment.

Most commonly of all, these disorders have the dual origin, excess of food plus functional failure, and the cases are often rendered more chronic and more difficult of cure by the accumulations of waste in the system, the result of deficient muscular exercise, and of failing excretory organs.

CHAPTER XI.

DISEASES DUE TO DEFECTS IN THE ORGANS OF THE FOOD SYSTEM.

Sketch of Normal Heart Functions.—The return-blood from the body (the venous blood) is poured into the right side of the heart, whence it is pumped through the lungs (where it is charged with oxygen) to the left side of the heart.

It enters the ventricle (the main cavity) of the left side, by the *mitral orifice.* This orifice is provided with valves, *the mitral valves,* which close when the ventricle contracts to force the blood-current on to the tissues. The opening by which blood passes on to the tissues is called the *aortic orifice,* and it is also provided with valves, *the aortic valves,* which prevent the regurgitation of the blood into the ventricle when this structure dilates to take in a fresh supply of blood.

The structure of the right side of the heart is closely similar to that of the left, but it is *very rarely* the seat of disease.

Sketch of the Valvular Diseases of the Heart.

(*a*) *When the mitral orifice is contracted,* there *must,* therefore, ensue: first, a slow engorgement (congestion) of the lungs, then an engorgement of the right side of the heart, then a similar state in the veins all over the body (inducing passive congestion of all organs), and finally dropsy.

(*b*) *When the mitral valves have been rendered incompetent* by disease, the same backward engorgement will take place, but the process will be a slower one. There will also be some increase in size of the left ventricle.

(*c*) *When the aortic orifice is contracted,* there will be great enlargement of the left ventricle, which for a time will compensate for the obstruction. To this will succeed a bagging-out and failure to contract of the ventricle, and then gradually all the secondary consequences of mitral disease. There will be, however, in advanced stages, some risk of sudden death on great exertion.

(*d*) *When the aortic valves are incompetent,* there will be a constant reflux of blood from the aorta and embarrassment of the left ventricle, telling back gradually on the right side of the heart and on the whole body. In advanced stages sudden effort may prove fatal.

The diseases of the orifices or valves of the heart are due to a puckering of their inner linings, the result of inflammation of these linings, such as is of common occurrence in rheumatic fever.

Treatment.—Caution as to great exertion and a maintenance of general health often prevent the occurrence of any distressing symptoms in heart disease, and suffice to prolong life to the natural term.

Other less common forms of heart disease considered. Arterial and venous diseases.

CHAPTER XI.

DISEASES DUE TO DEFECTS IN THE ORGANS OF THE FOOD SYSTEM.

I. DISORDERS OF THE HEART, ARTERIES, AND VEINS.

The following is a list of these food organs, with their functions:

(*a*) Concerned in the reception and digestion of foods: the mouth, stomach, and intestine, with each their glands.

(*b*) Concerned in secondary digestion: the portal vein and liver.

(*c*) Concerned in tertiary digestion—*i. e.*, the final destination of food: the following organs, which are so important that I shall italicize them.

(1) The *heart* and *arteries*, in the distribution of food.

(2) The *cells of the body*, in the combustion of fuel-foods (by the aid of oxygen) and the metamorphosis of albumen.

(3) The *lymphatic interspaces*, in collecting the products of combustion and metamorphosis; the *lymphatic pumps*, of which the principal are the pleuræ, worked by the movements of respiration; the pericardium, by the heart's action; the peritoneum, by the intestinal movements; the synovial membranes of joints, by the movements of the

limbs ; the lymph pumps of muscle-sheaths, worked by muscular contraction ; all concerned in moving forward such waste material along the *lymphatic ducts* and through the *lymphatic glands* towards the *veins*, whence it is expelled the body—the water and carbonic acid by the *lungs and skin*, the débris from cell metamorphosis by the *kidneys*, and, to a slight extent, by the *liver*.

(4) The *lungs*, concerned in the oxygen supply.

(5) Concerned in the formation or perfection of new blood corpuscles are certain tissues : these are the *spleen*, the *thyroid and thymus* glands, the *supra-renal* capsules, the *pituitary and pineal glands* and the *red marrow of bones*.

The above long list of organs may, consistently with the purposes of a work not intended to deal exhaustively with physiology, be considerably shortened.

In the first place, we have already sufficiently discussed the organs concerned in primary and secondary digestion, and need not, therefore, revert to them ; those of tertiary digestion alone concern us, and will be dealt with, conveniently, in the following order :

I. Disorders of the Heart, Arteries, and Veins.
II. Disorders of the Blood.
III. Disorders of the Blood-forming Glands.
IV. Disorders of the Lymphatics.
V. Disorders of the Skin.
VI. Disorders of the Kidneys.
VII. Disorders of the Lungs.

DISORDERS OF THE HEART, ARTERIES, AND VEINS.

Among the disease bogies which terrify humanity, the disorders of the heart hold a prominent place.

And yet this place is a usurped one, for grave heart failures are rare, the secondary derangements to which

they can give rise are easily foretold, and often, with care, preventible; while, as compared with sufferers from other organic disorders, the victims of heart disease enjoy a remarkably prolonged existence, and are rarely, except towards the end of their tether, inconvenienced by, or even conscious of, the existence of their complaint.

It may not be a waste of space to ask ourselves the reason why, the heart being without question the most important organ of the whole body—that organ on whose perfect action depend alike the movements of the body and those of the mind—it can reasonably be said that its derangements, both functional and organic, are often but matters of secondary importance. The answer is to be found in a study of the structure of the heart and the very universality, as regards the body, of its duties.

The heart is, first of all, nothing more than a round muscle, capable, like all muscles, of contracting and expanding; the inrush of blood supplying the stimulus, which, acting on the reflex-nerve mechanism situated in its substance, determines that regular, rhythmic action with which we are all familiar, and thus maintains an even supply of blood to all the bodily tissues.

Internally, the heart is divided by a strong muscular partition into two distinct halves, called the right and the left. The right side receives and pumps away to the lungs the venous blood which returns from the tissues, together with that from the liver; the left receives the red arterial blood on its return from the lungs, and pumps it away to the body at large to nourish the tissues. Each half of the heart is furthermore subdivided into the following two divisions, similar on both sides—a small and weak cavity called an *auricle*, which receives the blood and passes it on to a larger and stronger one called a *ventricle*, which does the work of pumping.

The ventricles at their points of intake and output are provided with simple valves, those at the inlet opening with the inrush of blood and closing as the ventricle contracts ; those at the outlet then opening and closing automatically by the pressure of the blood column above them, as the ventricle again dilates to take in more blood.

If the reader will think of the action of an ordinary rubber enema, which, as the ball dilates, takes in water by the tube coming from the water-supply, and as it contracts forces its contents onwards by the outlet tube, while all backward flow is checked by a simple valve, he will obtain a very fair idea of the action of each side of the heart.*

All the cavities of the heart and all its valves are lined by a smooth membrane (the endocardium), and it is to the inflammation and subsequent contraction of this membrane that the shrinking, and consequent imperfection, of the valves which constitute the basis of 90 per cent. of the cases of heart disease are due.

Now, the muscles of the body are, as compared with other organs, but infrequently the seat of any acute destructive lesion, and rarely fall victims but to one form of degeneration, the fatty variety ; and therefore the muscular tissue of the heart, though it may temporarily, like other muscles, lose tone, and that which depends upon tone, force and regularity, is but very seldom indeed attacked by any derangement which can permanently and seriously impair its structure and its powers.

Now, we have already, when speaking of the lymphatic system in general, referred to the serous bag (the pericar-

* I omit a description of the somewhat complex structure of the heart valves. Their function, which is exceedingly simple, is the great fact to be remembered, and I therefore limit myself to that one point.

dium) which surrounds the heart, and have stated that it, like the pleuræ and the synovial membranes of joints, is an integral part of the lymphatic system. The smooth internal lining of the heart is also, like those membranes, a portion of the lymphatic system (it contains *no* blood-vessels), and shares therefore in all the disorders of the system with which it is in communion. Now, *the* great acute disorder of the lymphatic system is, without doubt, rheumatic fever, and therefore this disease, affecting as it does almost exclusively the synovial and serous membranes of the body, is *par excellence* the great producer of heart disease, while, next in order as a prominent cause, stands its very close relation, gout. *Any* very acute blood disorder may, however, derange the lymphatic system, and through it both the joints and the heart, and therefore any fever, but most prominently scarlet fever, may also become the starting-point of disease in the heart or its valves.

We may thus say that, compared with other organs, grave disease of the heart is rare, and that when it occurs it almost invariably is a sequence of rheumatic fever, or, much less frequently, of gout or scarlet fever, and that the lesion is situated in the lining membrane of the heart, the contraction of this membrane, following on the inflammatory swelling of the acute stage of the disease which acts as causation, producing a puckering of the surface, of little importance as far as the lining of the heart cavities is concerned, but of vast importance in its effect on the calibre of their outlets, which it lessens (producing what is called stenosis), and on their valves, which it contracts and renders incompetent.

Now, the one great general and necessary result of either of these forms of disaster—and it is one which the reader should bear in mind, for by its light can be easily read all

the multitudinous consequences of heart disease — is impairment of the heart's function and of the circulation of blood.

The man, therefore, who has, as a result of disease, shrivelled heart-valves or contracted heart-cavity orifices, finds himself thus placed: his heart has lost one eighth, one sixth, one quarter, or one half, as the case may be, of its former complete power. It can still do work perfectly, and for the normal period of life, if that work be proportioned to its lessened power; but if an effort be made to undertake the old measure of effort with the lessened measure of heart-power, the result will be a slow, gradual, but sure loss of ground, which must end, ere the normal span of life is reached, in death, the result of heart failure.

It is not, therefore, the actual lesion, the valve contraction, which progresses, for that remains stationary, but the premature death is due to the lessened pumping power of a heart crippled by valve failure.

Now, the mechanism of the heart is so simple, and the instruments of precision by which its power may be gauged are so accurate, that it requires, on the part of a physician, only ordinary skill to be able to prescribe, with very fair exactness, the limits of daily exertion which a damaged heart can stand consistently with a normal expectation of life. How comes it, therefore, that the vast majority of patients with affected hearts rush on so blindly and heedlessly to a certain premature extinction of life?

Firstly, because their ordinary guide to disease, pain, is, in heart disease as in consumption, absent; both the heart and the lungs being endowed but poorly with sensitive nerves. Patients are therefore loath to believe in the existence of grave and progressive mischief. But we may ask: Does not the failure of the circulation induce symp-

toms which must force from such persons a due recognition of the gravity of their case? No, for the breakdown is gradual, and the human body re-establishes, in the way about to be described, an equilibrium, albeit a more and more unstable one, to meet each point of failure. In the first place, the cells of the heart possess, like all living cells, a residue of vitality, by virtue of which they, for a certain number of years, keep the heart intact and in action under the ordinary conditions of life; but extraordinary conditions are now present, the reserves of vitality are, in consequence, called up; the now overworked heart grows and thickens, and the increased muscular power, the result thereof, enables the circulation for a time to be maintained at the normal. But, sooner or later, the error of this spendthrift policy becomes apparent; the reserves become exhausted, the recuperative power of the heart falls below the demands made on it, the circulation slackens, the arteries are no longer sufficiently filled, and the veins become gorged; the lymphatic system, which eventually empties itself into the veins, shares, of necessity, in the engorgement, and the lymph escapes freely into the peritoneum, into the pleuræ, into the pericardium, and into all the tissues of the body, making its appearance first in the most dependent parts, the feet and legs, and thence, unless the strain be taken off the heart, gradually rising. In one word, we have the condition known as *general dropsy*.

And now the patient, perforce, must rest. Quietly lying in bed he learns a lesson, which, taken to heart in time, would have saved his life, for he sees that, the strain involved in bodily exertion once taken off the laboring heart, the circulation becomes normal, the dropsy recedes, and the sodden internal organs become once more dry and perform their duties; his appetite and breathing power begin once more to be healthy.

Again Nature bids him choose, but her terms are now much harder. Will he live for a few years a life of inaction, or will he, by a return to exertion, court a speedy and a worse return of dropsy in a few days, weeks, or months?

If he choose the latter, the second attack of dropsy will be more intractable that the first. More prolonged and more complete rest will probably result yet once more in a temporary recovery of the circulation, but the succeeding interval of health will be brief, and before long yet a third, and this time a probably fatal, return of dropsy will be on him.

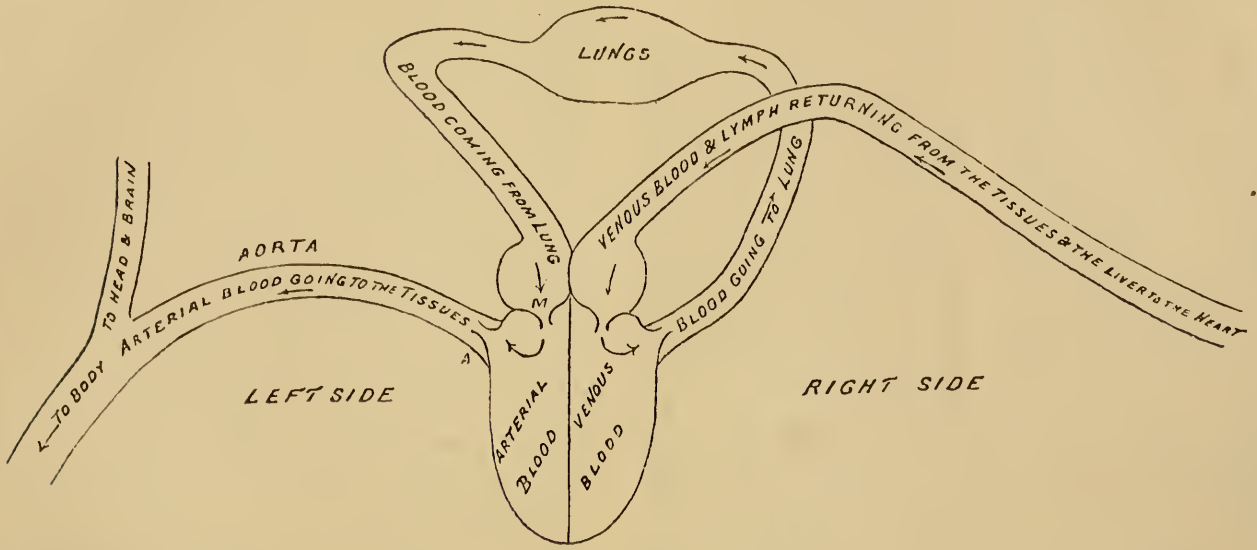
Such is, in a few words, the course of, and such the lessons to be learned from, one of the most common of all valvular lesions of the heart, mitral-valve incompetence, the result of imperfect closure of the valve which intervenes between the left auricle and the left ventricle of the heart.

Let us now discuss, a little more systematically, the special consequences of each valve lesion.

The heart consists, as we know, of two similar parts, a right and a left portion.

The disorders of the right side will not, however, require any attention at our hands, for, with the exception of dilatation of the right ventricle, which is, moreover, in nearly every case a direct consequent of pre-existing disease of the left side of the heart, and not, therefore, entitled to rank as a primary heart malady, disease of the right side of the heart is so exceedingly rare as to constitute, when present, a medical curiosity.

We therefore can restrict ourselves to the disorders of the left side and the consequences which each of them, respectively, will entail. The annexed simple diagram will assist in making the sequence clear.



Diagrammatic sketch of the Heart to illustrate its method of working, and the manner in which its separate diseases tell on the general health of the body (*vide* text, page 318).

Confining ourselves, then, exclusively to the left side only of the heart, we see that it has two sets of valves—the *mitral valve* (marked *M*) which opens to let the bright-red arterial blood from the lungs run into the ventricle, and which closes when this ventricle contracts and forces its blood contents to the tissues; and the *aortic valve* (marked *A*), which remains closed while the ventricle fills, and, yielding to pressure, opens when the ventricle contracts to force its contents onward to the tissues.

But, as the result of rheumatic fever, gout, etc., two abnormal conditions may occur at either orifice; either the opening may be contracted (this is called stenosis of the mitral or the aortic orifice, as the case may be), or the valves may be so shrunk as to fail to meet when they should close (this is called incompetence of the mitral or aortic valve, according to the situation).

Stenosis (Contraction) of the Mitral Orifice.

This condition must, in exact proportion to its extent, retard the current of blood from the lung, and hence delay its passage through the lung, and will therefore produce, as a first result, constant *congestion of the lungs*, varying in degree with the calls made on the heart by exertion and the amount of orifice contraction present. There will, therefore, be *breathlessness*, especially on exertion. The next inevitable consequence will be over-fulness, *engorgement, of the right ventricle*, and then a similar state of matters in the right auricle, this in its turn producing a distension of the large channel that feeds it and that brings the venous blood and the lymph from all parts of the blood. Thus the venous circulation will be slowed, and, to relieve it, forced by the pressure on them, the small veins and lymphatics will allow their thinnest fluid contents, the blood serum, to exude among the tissues;

thus *dropsy*, commencing where the current is weakest, in the most dependent parts, *i. e.*, the feet and legs, will appear, and will gradually advance, distending with fluid those large lymph cavities, the peritoneum (producing *hydro-peritoneum*), the pleuræ (producing *hydro-thorax*), and the pericardium (producing *hydro-pericardium*), which state of matters will, if it be permitted to progress, rapidly end in a mechanical and final arrest of the heart and lungs.

The only rational treatment is *rest*, and temporary improvement of the heart's tone by such suitable food as can be digested. It is evident that no drug can avail to abate, much less to permanently rectify, this vicious circle of disorder. It is folly, in the absence of complete rest, to administer a cardiac stimulant, even as a temporary palliative; it is worse than folly, in the possession of even elementary anatomical knowledge, to pretend to a cure by means of it.

Much can, however, be achieved by timely and judicious advice, for, in at least the vast majority of instances, the progress of events extends, ere the final stages of general dropsy are reached, over many years, and this interval of fair health may be doubled or trebled by the careful avoidance of undue exertion; the general health, upon which the tone of all muscles, and therefore of the heart, depends, being carefully, by means of a well-ordered life, maintained at its best.

Stenosis of the mitral valve may, when of many years' standing, and when the heart's action is much embarrassed, lead, after violent exertion, to sudden death, but such a termination, compared with a gradual extinction of life by dropsical effusion, is rare.

Incompetence of the Mitral Valves.

In the case of mitral stenosis just considered, the auricle

could not, owing to the contraction of the auriculo-ventricular opening, empty itself, and fill the ventricle in proper time; in mitral incompetence, which we are now studying, the ventricle is easily and completely filled, but on contraction not only forces the blood on by that great channel, the aorta, to the body in general, but also, since the mitral valves do not meet, forces some blood *back* into the auricle, keeping this latter cavity, as in mitral stenosis, always overfilled with blood.

And this engorgement of the auricle leads, as in mitral stenosis, first to *congestion of lungs*, then to surcharge of the right side of the heart, then tells backward on the general venous and lymphatic circulation, and ends necessarily in general *dropsy*.

Thus the secondary consequences of mitral stenosis and of mitral incompetence run on precisely the same lines, but the results of mitral incompetence are not so quickly seen, inasmuch as the embarrassment of the heart is less, and therefore the disease itself is not of equal gravity to mitral stenosis; indeed, many people are through a long life never inconvenienced by the presence of this lesion, which, moreover, even in the worst cases, scarcely ever can lead to sudden death.

The treatment consists, as before, in the maintenance of the general health and the exercise of caution as regards exertion.

Sometimes, indeed, towards the end of heart failure, when the laboring left ventricle of the heart (thickened at first, but subsequently dilated) shows, by the hesitancy and irregularity of its contraction, the extreme difficulties under which its ever imperfect functions are performed, a heart stimulant, such as digitalis, strophanthus hispidus, or convallaria majalis, may, to recall more rapidly than can rest alone, the normal tone and rhythm of the heart,

be had recourse to. But, beyond the very temporary restoration of regularity of action, no benefit that cannot be more safely and more permanently obtained from complete rest is thereby secured.

Let us now turn our attention to the aortic opening (marked *A* on the diagram), and study the similar conditions of stenosis and valvular incompetency as occurring there.

Stenosis (Contraction) of the Aortic Orifice (marked *A* on diagram).

Any narrowing of this outlet must render the complete emptying of the left ventricle a matter of greater difficulty than it is in a normal state.

This increased demand for muscular power on the part of the left ventricle leads to a thickening of its muscular walls, and therefore to a more powerful contraction; this is called the stage of *compensation*, that in which the increasing muscular power keeps pace with the obstructive difficulties.

During the stage of compensation, beyond the sense of a powerfully acting heart, the sufferer experiences no discomfort, for the heart is performing its full duties. But the reserve force of the muscular cells in the heart wall are all the time being freely called up, and the day of bankruptcy must and does arrive, the stricture of the orifice remaining *in statu quo*, while the muscular power of the heart is breaking down. The ventricle can now no longer at each beat perfectly empty itself, the blood current to the body gets smaller and smaller, while the ventricle bulges, and the auricle, the lungs, the right heart, and the veins and lymphatics of the body become each, in due backward order, engorged. Thus, in the majority of cases, dropsy closes the scene, as in failures at the mitral orifice; but sudden death, the result of some un-

usual demand made on the heart when the compensation stage has passed, is very common.

The treatment is the same as in mitral stenosis and mitral-valve incompetency—namely, wise economy of the enfeebled heart powers and attention to the general health. Heart stimulants may, towards the end, be employed to tide over moments of extreme danger from heart failure, but the wisdom of such a course is very doubtful.

Incompetence of the Aortic Valve.

In this case there is, owing to the patency of the orifice, the result of imperfect closure of its valves, a regurgitation of blood back into the ventricle from the aorta.

This produces overloading of the ventricle, and leads, as in the case of aortic stenosis, to thickening of the ventricular muscular walls, to cope with this symptom. Here we have again a first stage, often lasting for many years, of *compensation*, marked by no disagreeable evidences of disease.

To this, at length, succeeds failure of compensation and the various backward engorgements, ending in dropsy, which we have already studied.

In both aortic stenosis and incompetence of the aortic valves, the defective arterial supply leads, as compensation fails, to *faintness*, *giddiness*, and *defective vision on exertion* due to an imperfect arterial blood supply to the brain.

In both diseases, while a gradual death by dropsy is the more common issue, sudden death is not infrequent.

The treatment is the same in both disorders.

To sum up: In all disease at the orifices of the two cavities of the left side of the heart (and such are 90 per cent.

of all cases of heart disease), the following truths must be borne in mind:

There is *no* local pain.

There are, in the early stages, usually no general symptoms of discomfort.

In the later stages, shortness of breath, due to engorgement of the lung, is an early sign, and this is succeeded by venous congestion of the organs of the body, and therefore mainly by dyspepsia and liver derangement, which precede, often by months or years, the actual and visible dropsy of the tissues of the feet and legs.

Sudden death is a rare termination of lesions at the mitral orifice, but a fairly common one of those at the aortic opening.

The treatment by rest, if commenced in time, will often suffice to altogether prevent premature death from heart failure, and always markedly to prolong life. At every stage, in rest and a regular mode of life consists the sole treatment. Heart stimulants are only needed in great emergency; and the reaction which, of necessity, follows their use tends in most cases actually to shorten life.

The rare diseases of the orifices of the right side of the heart lead, as those who have followed me must clearly see, even more rapidly than do those of the left side, to engorgement of the lungs and of the whole venous system, and to general dropsy.

Let us now briefly review those few, and, from their rarity, almost unimportant, heart failures, not the sequences of an inflammation of the lining membrane of the heart, and a consequent shrinking of the valves, or of the apertures, of heart cavities.

Malformation (Congenital) of the Heart.

Most people at the present day are aware that each human being, during the intra-maternal portion of its existence, passes through a course of development, each stage of which is fairly representative of one of the lower orders of animal structure. As regards the organ now in question, the heart, it is in the human embryo at first absent, as in the protozoa; then consists of but one cavity, as in the crustaceans; then of two, as in the fishes; then of three, as in the reptiles; and finally of four, as in the birds and mammals.

Sometimes, from causes interfering with the maternal circulation, this development is arrested, and the infant is born with but a two-chambered heart. This is exceedingly rare, but an infant with a three-chambered, a reptilian, heart, is a fairly common phenomenon.

When such malformation has occurred there is no difficulty attending its instant recognition, for, when the arterial and venous blood-cavities communicate, all the blood pumped to the tissues must, in place of being scarlet, be of a purple hue and impart that color to the skin. The infant is therefore *blue*. The blood will also, like that of the reptiles, be of low temperature, and the body will therefore be cold.

Such children, unfitted as they are to exist under the ordinary conditions of human life, die in the course of a few hours, days, or months. In rare cases, and where the malformation has been but slight, twenty years of life, or even more, have been reached.

Inflammation of the Muscular Substance of the Heart.

Except as a very rare sequence of general blood-poisoning, inflammation of the muscular substance of the heart is scarcely known.

Sometimes, however, in rheumatic fever, inflammation of the inner lining membrane of the heart (the endocardium), or of the bag which encloses the heart (the pericardium), may extend to the substance of the heart itself, but such secondary inflammation is uncommon. When it occurs it ends almost uniformly in death by heart rupture.

Inflammation of the Inner and Outer Linings of the Heart.

This is the very common sequence of rheumatic fever, or indeed of any severe disorder affecting the lymphatic system, with which the linings of the heart are in direct communion, and indeed of which they form an integral part.

(*a*) **Inflammation of the inner lining,** *the so-called endocardium*, occurs in more than half the cases of rheumatic fever. Sometimes it is slight and leaves no embarrassing contraction behind, at other times it is more severe and leads to one or more contractions of the apertures of the heart cavities or of their valves. The consequences of both of these circulatory impediments we have already discussed.

(*b*) **Inflammation of the outer lining,** *the so-called pericardium.* The pericardium is the lymph sac, in a reduplication of which the heart rests.

Any acute disorder of the general lymphatic system, and rheumatic fever is the almost sole example of such derangement, may lead to inflammation of the pericardium, followed usually by the effusion into it of a large surplus amount of fluid.

The result of such pericardial distension is to push the heart upwards, and, by compressing it, to impair or even to arrest its movements.

The treatment consists in proportioning, by means of

absolute rest, the decreased heart functions to a minimum of exertion, and if, in spite of such measures, the fluid still rises and the embarrassment of the heart becomes greater, to tap the pericardium.

The outlook in this form of inflammation, technically called **Pericarditis,** is always grave. Perfect recovery occurs in about 60 per cent. of all cases; imperfect recovery, the surfaces of the pericardium remaining permanently glued together, in about 30 per cent., death resulting in about 10 per cent. Concurrent disease of the heart or of other severe disease, such as *Bright's disease* or *diabetes,* renders the prognosis always very serious.

Degenerations of the Heart.

(*a*) **Fatty Degeneration.**—This consists in a gradual metamorphosis of the muscular fibres of the heart into fat, the result of disease of the small arteries which feed the heart muscle, or of a general failure of nutrition, such as is seen in diphtheria, typhoid fever, etc.

The symptoms are *weak action of the heart,* with *shortness of breath,* and sometimes with signs of *general dropsy.*

The prognosis is always grave, but, since the diagnosis is difficult and never absolutely certain, need not be hopeless.

Treatment consists in rest and in the adoption of measures calculated to improve the health.

N. B.—It is very necessary not to confound fatty degeneration of the heart, occurring always in the feeble, and nearly always in the meagre, with *fatty depositions* on the heart, a mere agglomeration of adipose material on that organ, to which the obese are subject. In the former disease the heart is apt to rupture on exertion, in the latter to stop by reason of the superincumbent deposits of fat.

The treatment of fatty degeneration is rest, that of fatty deposition consists in a reduction of the obesity, and in the improvement of muscular tone, by cautious exercise.

(*b*) **Cancerous Degeneration.** — Cancer may attack the heart, but this site of cancer is a rare one.

(*c*) **Enlargement, Dilatation, and Misplacement of the Heart.**—These we have studied in connection with their *almost* sole causes, disorders of the orifices of the apertures of heart cavities and derangements of the pericardium.

All three may, however, occasionally be secondary to other disorders. The muscular enlargement may be due to advancing kidney mischief (gouty kidney), or to overexertion, as seen sometimes in athletes; the dilatation, to failure of general health; the misplacement, to tumors in the chest or to pleurisy.

Ere we quit, with a few remarks on its functional derangements, the subject of the heart, we must refer to one cardiac disorder, or rather one symptom, **Angina pectoris,** which may depend upon either severe and dangerous organic disease of this organ or upon some transient and purely functional derangement.

Angina pectoris, or *breast-pang*, is, as its name implies, a symptom only, and we shall discuss it as such.

It is characterized by the *sudden* occurrence of usually *intense* pain, which darts from the region of the heart to the left side of the head or down the left arm, and is accompanied by a feeling of *suffocation* and a *sense of impending death.* The attack may last for a few seconds or for hours, generally the former, and usually recurs at uncertain intervals.

The treatment consists in an active search for the underlying cause, and its removal when possible.

Angina pectoris is rare under fifty years of age, and is

commoner in males than in females. The actual seats of pain are the nerves of the heart and of its large vessel, the aorta, and this pain may be due to the circulation of some poison, notably gout poison, in the blood, producing a neuralgia, or may depend upon a failure of the blood supply to the heart muscle, due to degeneration of the arteries. In the former class of cases the outlook is hopeful, in the latter almost hopeless.

The attack may usually be cut short by the inhalation of nitrite of amyl, which may be carried about in glass capsules, each of which, when broken, liberates a fair dose for inhalation of this drug. If this fails, full doses of alcohol in very hot water should be administered.

Functional Derangements of the Heart.

Grave diseases of the body, whether of the lungs, heart, liver, or of any other organ, if unattended by the symptom of localized and acute pain, fail often, in spite of the physician's most serious expressed forebodings and warnings, to impress the patient's mind with a due sense of their importance, simply because the impairment of function to which they give rise is, at first, so trivial, and increases so gradually, as to escape notice, and because the disease is local, as far as any disease of the human body can truthfully be called so.

Functional disorder, on the other hand, is the expression in one, the weakest, part of the body, of a general derangement of health, and therefore appeals from a thousand sides to the subject of it, and, very early in its course, raises, in the mind, great, and often unfounded, alarm.

For these reasons sufferers from fancied disease of the heart outnumber, as a hundred to one, the subjects of genuine cardiac mischief.

It is amusing to note the number of fragile mortals who

suffer from a **weak heart,** and who desire that this organ should be speedily strengthened. They are like children crying for loaded rifles. What havoc indeed a strong heart, their ideal heart, would play in their feeble body! Their heart may indeed, as compared with that of a robust youth, be justly regarded as weak and feeble in action, but it is in exact keeping with the needs and general condition of their body—the only test of a perfect heart. If they choose to improve the tone of the general muscular system, the heart will keep pace with such improvement. The only weak heart that is a danger, that requires any form of treatment directed specially to its state, is the very rarely found heart that is undergoing fatty degeneration, that lags hopelessly behind even when the bodily demands made on it are at their lowest.

In dealing with atony of the stomach and intestine I showed the fallacy of endeavoring to whip up temporarily and exclusively one debilitated organ, and proved that the only end gained could be to force out of that general equilibrium of bodily organs that exists even in debilitated states the organ selected for stimulation. The true line of treatment is evidently to try and raise, by hygienic measures, each and every bodily organ simultaneously, to establish, in short, an equilibrium of strengthened organs.

The weak heart, therefore, is not entitled to rank even as one of those functional cardiac derangements which we must now discuss.

Palpitation.—This term is held to include all attacks of violent, rapid, and sometimes irregular action of the heart, attended often by feelings of tightness in the chest, shortness of breath, faintness, and fear of impending death—a group of symptoms with which, to a greater or less extent, we have all been at one or other period of our lives familiar.

Palpitation is but *very rarely* a symptom of disease of

the heart. This statement may appear so incredible that I will quote verbatim from a private proof-sheet of lectures issued by the present distinguished Professor of Medicine in the University of Edinburgh: "Causes of palpitation: Morbid irritability; peripheral or central irritation of nerves; altered states of the blood (gout, etc.); the use of various articles of diet or luxury, and certain mechanical conditions."

The above list of causations may appear to lay readers a little technical, but to the sufferer from palpitation it will be at least reassuring to know that heart disease ranks so low as an agent in this disorder as to be deemed unworthy of notice, unless, indeed, it find a place under the heading of mechanical conditions.

Treatment can only be applied when the special cause, which lies outside the heart itself, has been traced home.

If the disorder be dependent on a blood poison, which generally will be found to be either uric acid (gout poison) or lead, the line of treatment resolves itself into the special means for eliminating such abnormal ingredient from the blood-stream. If the blood be not the seat of the enemy, the nervous system may be justly suspected, and in the excessive use of tobacco, in great mental anxiety, prolonged brain-work, or in nervous debility, the result of anæmia, may the cause often be found.

If in these two departments our search is baffled, we turn to the other organs of the body, especially to the stomach, liver, intestine, and kidneys (in females, to the womb and ovaries), for indications in them of disorders that can tell reflexly upon the heart, and our treatment will depend upon our discoveries. In no case is the heart to be treated, for, again I repeat it, the malady is not located, but only *manifested*, in that organ.

But, the reader may ask, how is he, without special

anatomical knowledge, to make the necessary investigations? In reality, they are not necessary; for, if the sufferer will only, by the light of his common-sense, revise his mode of life, removing therefrom what by common experience of mankind is noxious, diligently pursuing that which is health-promoting, he will rarely fail to expel the cause of every functional derangement, whether of the heart or of any other organ.

A few words, ere we leave this subject, on the diagnosis of heart disease.

Though to the physician, possessed of a quick ear, the differentiation between organic and functional disease, and between the various grades of each, is usually a matter of great ease and simplicity, yet the amateur physician can never be recommended to handle the stethoscope with a view to the making of a diagnosis.

Even the professional man may, for the following reasons, be himself at fault.

A heart may be healthy, adequate to all the needs of a long life in its possessor, and yet may not conform to the ordinary standard of regularity or rhythm, recognized as characteristic of a healthy organ. Even the position of the heart may be abnormal, and yet the malplacement be productive of no ill results.

Again, consistently with perfect structure, loud "murmurs," similar to those produced by valvular disease, may, in bodily states marked by a deficiency of red-blood corpuscles (**Chlorosis**), or by such deficiency, plus a lack in the other blood constituents (**Anæmia**), be heard. Usually in these cases the differential diagnosis may be made by a study of the area within which the murmurs are most distinctly heard; but in others, the poor condition of the blood, and the absence in the medical history of any illness that can produce actual disease, must be relied on.

These "functional murmurs," as they are called, disappear as soon as the condition of the blood is, by means of pure air, rest, and well-selected food, restored to the natural state. A visit to a ferruginous spring is, in some obstinate cases of anæmia, commendable.

Diseases of the Arteries, Capillaries, and Veins.

Inflammation of the arteries, though it does actually occur, is so exceedingly uncommon as to demand no notice at our hands. As with the heart, so with these vessels, it is the lining membrane (the endarterium) which generally is the seat of inflammatory mischief.

Inflammation of the capillaries is practically unknown as a primary disease.

Inflammation of the veins (Phlebitis) is not an uncommon sequence of the distension and bulging of these channels, characteristic of the varicose condition. It is therefore most frequently seen in the lying-in room, within the first month which succeeds parturition. It is one of the great causes of "white leg" or "milk leg."

The first consequences of inflammation in a vein are roughening and swelling of its inner surface, which speedily lead to coagulation of its contained blood. The coagulum formed is called a "Thrombus." This will lead to one of three terminations: (1) the vein and clot may gradually shrivel and disappear; (2) the clot may set up irritation and lead to the formation of a curative abscess; or (3) a portion of the clot may break off and be swept on, perhaps in a semi-decomposing condition, to a distant blood-vessel, which it may occlude, or wherein it may develop an abscess, leading in its turn to other abscesses. Such a travelled thrombus is called an *embolus*, and the sufferers from either are said to be suffering respectively from *thrombosis* or *embolism*. Thrombi may form on any ir-

regular surface, such as a heart valve roughened by inflammation of its lining, and are then apt to be swept away, to lodge not infrequently in the brain, producing sudden and grave mischief.

The line of *treatment* in thrombosis is evident, for, since in the breaking up of the clot and the migration of its particles lies the greatest risk, absolute rest is a first essential. Pain may be relieved by the application of heat in the form of poultices or hot fomentations. Friction over the seat of the thrombus is, of course, to be rigidly avoided.

By far the most frequent seat of thrombus is, as I have said, the leg, and the above treatment is suitable to this disorder when occurring in that locality. When thrombi form in the heart there is usually no warning of the danger, and therefore no time for treatment.

Atony, or lack of tone, in the arteries and veins, or rather in their muscular coats, is an accompaniment of general muscular debility. The extent of its presence may be roughly gauged by the amount of vertigo or faintness which follows when the head, after being bent to a lower level than the trunk, is suddenly raised. The treatment consists in improvement of the general muscular tone of the whole body.

Degeneration of the blood-vessels of the body is common, and is one of the most frequent causes of premature and even sudden death.

Disease of this nature comes on first in the arteries, where its consequences are grave; only quite in the later stages do the veins become affected, the disorder usually proving fatal ere the latter are noticeably impaired.

Two great causes lead to degeneration of the arteries: their systematic overwork and chronic inflammation of their lining membrane.

Only in professional athletes, and under quite excep-

tionally severe and prolonged manual labor on an insufficient dietary, can early degeneration of the arteries be the result of simple overwork, and even in these cases it may be said that the disease is a normal phenomenon of a premature old age, and no more entitled to be ranked as a disease than the perfectly natural degenerations of the blood-vessels and of the body at large which are the necessary sequences of all old age. The athlete, in short, deliberately "forces the pace" of the circulatory apparatus, and brings about a premature breakdown thereof, this end being, however, only reached when the apparatus has done, so to speak, a full and fair, if a condensed, life-work.

Chronic inflammation of the lining of the arteries, the second great cause, thus works its ends: in the first place there is, as the result of a disease affecting mainly the lymphatic system, and hence the internal lining of the arteries, which, like that of the heart, is a lymphatic structure—and such diseases are syphilis, rheumatism, and gout—chronic inflammation of the inner coat of the artery, which results first in a thickening and hardening of it, and then in its *fatty degeneration*, or in the deposit of salts of lime in the middle coat of the artery, which latter is styled *calcareous degeneration*.

The existence of this degeneration in any of its stages is usually recognizable by the thickening and tortuosity produced in the arteries, which, in the arteries to the temples, and sometimes even in those of the pulse, are plainly visible.

The dangers are: (1) the formation of blood-clots (thrombi) on the thickened and roughened inner lining of the arteries; (2) the partial giving way of an artery and the consequent formation on one of them—often the great main channel, the aorta, which has to bear most strain—

of a small blood sac, which grows by the constant force of the blood-stream, till it either causes death by bursting, or by eroding in its growth some vital organ; such a blood-filled sac is called an **Aneurism.** (3) In place of this partial and gradual rupture, sudden fracture of a blood-vessel, usually in a portion of the body where the blood-vessel receives least collateral support, such as the brain, may occur. If, as generally happens, the brain is the seat of the consequent blood effusion, the disease called **Apoplexy,** so common a sequence of the arterial degeneration natural to old age, occurs.

The resulting pressure on the brain generally leads to unilateral paralysis, but may sometimes cause sudden death.

Treatment.—The first object in treatment is to modify the influence of, or, if possible, to remove, the cause at work in the production of arterial degenerations. This will check at least the rapid advance of the malady. The mischief actually done is, of course, irremediable, and our attention must therefore be confined to the careful avoidance of the secondary consequences attendant on degeneration, such as rupture, partial or complete, of the weakened blood-vessels. This end is only to be obtained by rest and quiet, especially by the avoidance of *sudden* and violent effort. The treatment of a formed aneurism resolves itself, according to the site and size of the blood sac, either into the adoption of surgical means of cure or of palliative measures, of which rest, I need hardly say, is the chief.

CHAPTER XII.

DISEASES DUE TO DEFECTS IN THE ORGANS OF THE FOOD SYSTEM.

Disorders of the Blood and Blood-making Glands.—Structure and Functions of the Blood.

THE DISEASES OF THE BLOOD.

I. *Due to non-living poisons in the Blood—e. g.*, Lead, Arsenic, Mercury, etc.

II. *Due to living poisons* (*Bacteria*) *in the Blood,* producing the *Fevers:*

(*a*) Bacteria that enter by the stomach or lungs cause the following diseases: Simple Continued Fever, Mumps, Influenza, Measles, Epidemic Roseola, Scarlet Fever, Typhoid Fever, Typhus Fever, Famine Fever, Yellow Fever, Dengue, Small-pox, Chicken-pox, Remittent Fever, Intermittent Fever (Ague), Epidemic Cerebro-spinal Meningitis, Cholera, Diphtheria and Diptheritic Croup, Whooping-cough.

(*b*) Bacteria that enter only by a wound cause the following: Syphilis, Tuberculosis, Erysipelas, Pyæmia, Tetanus, Hydrophobia.

III. *Due to unknown changes in the Blood.*—Purpura, Scurvy.

THE DISEASES OF THE BLOOD-MAKING GLANDS.

Leucocythæmia, Adenia, Addison's Disease, Progressive Pernicious Anæmia, Simple Anæmia, Chlorosis, Exophthalmic Goitre.

CHAPTER XII.

DISEASES DUE TO DEFECTS IN THE ORGANS OF THE FOOD SYSTEM.

II. AND III.—DISORDERS OF THE BLOOD AND OF THE BLOOD-FORMING GLANDS.

A WORD first as to the composition and the functions of the blood in health.

Its Composition.—Human blood consists of a liquid and a solid portion.

The liquid part, the plasma, is, as I have more than once stated, the final representative in the body of the foods consumed. It will therefore not surprise us to know that it contains, on an average, of soluble albumen, 8 to 9 per cent.; of grape-sugar, of fat, and of various mineral salts, of each, from 1 to 2 per cent.; and of water nearly 90 per cent. In addition, it holds in solution the débris of cells, represented by urea, and minute traces of extractives of different kinds.

The solid portion is made up of two varieties of minute bodies, the so-called corpuscles, the one kind plentiful, round, and colored—red when stored with oxygen in the arteries, purple when laden with carbonic acid in the veins; the other variety scanty, of varying shape, and nearly colorless.

The colored corpuscles (the so-called red-blood corpuscles) are mere mechanical carriers of oxygen to, and of carbonic acid from, the tissues; the colorless ones (the so-called white-blood corpuscles) are living amœboid cells, and have the power of leaving the fine-walled capillaries of the body and of wandering among the fixed body cells.

The white-blood corpuscles are, there is strong reason to believe, manufactured in the spleen and the lymphatic glands, possibly also in the thymus, thyroid, and other small and unimportant organs. As to the origin of the red-blood corpuscles there is still much diversity of opinion, some physiologists maintaining, with Kölliker, that they are only altered white corpuscles; others, with Neumann and Bizzozero, that they are developed independently of them in the red marrow of bones.

The Functions of the Blood.—The plasma nourishes the tissues, including the white and red blood corpuscles. The red-blood corpuscles convey oxygen to, and carbonic acid away from, the cells of the body, while the exact *rôle* of the white corpuscles in the bodily economy is as yet a matter of speculation.

II. DISORDERS OF THE BLOOD.

We have already, in an earlier chapter, dealt with the results both of a mere poverty and of an over-richness of the blood plasma; we now come to the actual diseases of the blood, due to the presence within it of poisonous substances. Of these there are two great varieties, the non-living and the living.

Blood Poisons not endowed with Life.—*Minerals foreign to the body* may, when taken in the form of salts soluble in the digestive juices, pass through the liver with the other and necessary salts contained in water and food, and thus enter the blood-stream.

It is therefore in the liver that traces of poison, when death by poisoning is suspected, are primarily to be looked for. But poisons do not pass that great janitor at the entrance of the circulation, the liver, unchallenged or unopposed. Not that this organ is endowed with a sense of right or wrong, but that, simply as a result of its development, it is adapted to give a free passage only to certain accustomed articles, and as most poisons differ in their chemical characters widely from albumen, grape-sugar, or the chlorides of sodium, of potassium, etc., they are liable to be arrested and sent to the right-about with other excreta by way of the bile ducts, and this arrest and the disturbance of the biliary function which ensues thereupon are evidenced by a severe *attack of a form of biliousness*, accompanied by *headache* and sickness, the first warning the body often receives of the presence within it of any form of poison, from a mineral such as arsenic to the living bacillus of yellow fever.

The early fathers of medicine were not slow to read the meaning and uses of such phenomena, and everywhere in their works we find that the recommendations for the early treatment of fever included, as an agent of first importance, an emetic, modern science confirming in this, as in many other of their supposed mistakes, the perspicuity of their observations and the correctness of their deductions.

Among mineral poisons, *lead*, *arsenic*, and *mercury* have become more or less familiar to the public, at least in the pages of the press, if never in the experiences of actual life. When a single large dose of any of these, or of kindred mineral poisons, has been swallowed, the symptoms that arise are so urgent, so alarming, and so characteristic, that they can barely escape the recognition of any intelligent man. It is therefore only in small and oft-repeated doses that lead and arsenic become formidable through

the slow and insidious sapping of the general health resulting from their consumption.

Leaving aside those who have the handling of the poisonous lead salts—*i. e.*, plumbers, painters, and oilmen, and who well understand the risks they run in the pursuit of their respective businesses—the only source of danger to a member of the general public from lead poisoning lies in the water he consumes. Soft water and distilled water, if in contact with metallic lead, become rapidly contaminated—as, by the way, do also cider, perry, and acid wines. Some of the hard waters may even be dangerous if conveyed in lead pipes or stored in cisterns of that metal, and therefore in the country it is well either to avoid such conveyance and storage, or to have the water carefully analyzed. In towns this matter receives careful supervision at the hands of eminent scientists.

Arsenical poisoning usually takes its rise in the employment of arsenical dyes for articles of clothing or for wall-paper.

Material of vegetable origin, such as *opium*, *morphina*, *strychnina*, *prussic acid*, *belladonna*, etc., may become a source of danger, and here, as in the case of mineral and fever poisons, if the dose consumed is great, the consequent derangements act at once as a warning and a cure—at least of a partial nature—sometimes the stomach and bowel, and sometimes the liver, playing the part of the policeman, and seeking to eject the intruder. Indeed, it is to the action of those organs that we are indebted for the sometimes very useful purgation or emesis set up by medicaments. The results of ipecacuanha on the stomach, of aloes on the intestine, and of podophyllin on the liver, are merely due to the repellent effects of each of those organs on the drug. If, moreover, we continue to swallow these drugs in the same quantities we shall find that the

characteristic phenomena produced by each become less and less marked, and finally cease. Then we say that *tolerance* of the drug has become established; each organ has, in short, become educated, as it were, to deal with each of those vegetable extracts, to accept them as one of the ordinary conditions of life, and a discontinuance of them will then, for a time at any rate, cause a derangement of the bodily health.

These remarks are true of *all* poisons, though of some, probably of those which have most chemical affinity to bodily factors, more so than of others. Thus arsenic, which has in many ways a resemblance to iron, a normal ingredient in red-blood corpuscles, can, if the dosage is carefully graduated, be eventually consumed by man in large quantities without apparent gross derangement of health; the same may be said of opium, the consumption of large quantities of which is not incompatible with a long life. Even a tolerance of the most deadly fever poisons may, as we know, after an education of the bodily tissues, which, however, must, as a rule, extend over generations, be established — the negro races who brought yellow fever to America enjoying now almost complete immunity from the scourge; the same being true of the European races as regards measles, and to a large extent as regards small-pox, the former of which acts as a malignant enemy to many black races, while the latter scarcely grants them any chance of escape.

It is obviously impossible, even were it judicious to make the attempt, to deal in the limit of these pages with the symptoms and the treatment of cases of rapid or of slow poisoning. I need only say that if any portion of the poison consumed yet remains in the alimentary canal it must, first of all, and as far as possible, be ejected therefrom by means of artificially induced vomiting or purgation, while

the small balance which may be assumed to have escaped expulsion by those means should be rendered harmless by the administration of antidotes — that is, of substances which can so act on it as to render it insoluble in the digestive juices and therefore incapable of absorption into the blood; while, finally, the emission of that part that may have already entered the blood-stream must be undertaken by the skin and kidneys, whose full action should be encouraged. Such, in the vast majority of cases, is the rational line of treatment.

Living Blood Poisons.

Under certain conditions, living micro-organisms of an unusual kind enter the blood-stream, multiply—and in so doing raise a fermentative series of changes—therein, and produce certain well-known varieties of disease, among which the most numerous and the best known are *the fevers.*

Twenty years ago the above proposition would have been ridiculed ; to-day it receives the almost unanimous consent of the medical world. Unlike most medical theories, which have been developed in the fertile brain of some chamber medical philosopher and have naught but a subtle metaphysical basis to recommend them, the doctrine of the bacterial origin of fevers rests chiefly on ocular proofs, requires no special medical training for its fullest comprehension, and can with confidence appeal to the whole scientific world, professional and lay, for a verdict.

Medical pathology, while busy in sketching and tabulating the many phases of human shipwreck, and in that capacity long of little practical service to the physician in his combat with disease, has in these latter days discovered the *causa causans* of fever, and is now largely employed in carefully compiling a series of observations

which bid fair to assist humanity in that which humanity has always demanded at the hands of medical science, the avoidance of shipwreck.

In the form of separate propositions I will now tabulate, firstly, the results of experiments susceptible of accurate proof; and, secondly, the deductions drawn therefrom.

It has been proved that—

(*a*) The air, not only that we breathe, but that contained in all liquids and solids, in every region of the earth, is laden with living organisms called, by reason of their smallness, *micro-organisms.*

(*b*) That these micro-organisms are the sole causes of that fermentative change, called putrefaction, which commences when the vital power of living organisms fails, and which, when vitality is extinguished, restores organic matter to the inorganic form.

(*c*) That the form and consequently the powers of micro-organisms are, like those of all living creatures, modified or destroyed by changes in their environment.

(*d*) That the following conditions affect them greatly:

(1) Temperature.

(2) Moisture.

(3) Amount of oxygen present.

(4) Amount and variety of their pabulum present.

(*e*) That, according to the combination of circumstances arranged, special micro-organisms may be *cultivated.* A high temperature (80° F. to 180° F.), moisture, comparative absence of oxygen, and the presence of a large amount of dead organic matter being generally most favorable, and the opposite conditions those least favorable, to the rapid evolution and development of these micro-organisms. In fact, conditions unusual in Nature result in an equally unusual micro-organism, while the ordinary conditions on this earth tend but to keep alive the common varieties.

The more unusual the conditions, the more unusual, as a rule, the resulting micro-organism.

(*f*) That a new variety once developed may be perpetuated indefinitely under favorable conditions.*

So far the laboratory experiments carry us; now for fair deductions:

(*a*) The body of man has become habituated to the inbreathing and consumption of the ordinary varieties of micro-organisms, and these are not only therefore innocuous, but probably even useful, to his economy.

(*b*) The new forms of bacteria developed under unusual conditions act on man as do those minerals and vegetable extracts to which his body is unaccustomed, as antagonistic forces, or what are called poisons.

(*c*) Bacteria being living ferments, like the yeast plant, and the blood, the fluid in which they act, of restricted amount, for it can undergo scarce any replenishment in fevers, it will follow that the fevers will all end in spontaneous cure, the bacteria dying, either because their normal life-term is reached, or, much more probably, because the accumulation of the chemical products of their fermentation destroy them, just as the yeast plant is killed by the alcohol it itself has produced when that alcohol exceeds 20 per cent. of the total fluid.

Thus the question stands at the present day.

The diseases which result from the entrance of micro-organisms, of living ferments, into the blood are known as the *idiopathic fevers*, and are to be distinguished from fever the result of a local inflammation.

The following is but an imperfect list of the idiopathic

* The spores are surrounded by a thicker and stronger cell-wall than are the bacteria from which they develop. They are consequently *hardier* products than the original bacteria. (*Brit. Med. Journal*, Dec. 8, 1888, Address by Professor Charteris.)

fevers. In some of them there is direct proof that a micro-organism is concerned in their production ; in others the evidence is not so complete, but is still strong. Others of really doubtful origin, such as pneumonia, I have omitted from the list and reluctantly ranged under the old classification :

Simple continued fever.
Mumps.
Influenza.
Measles.
Epidemic roseola (German measles).
Scarlet fever.
Typhoid "
Typhus "
Famine "
Yellow "
Dengue
Small-pox.
Chicken-pox.
Remittent fever.
Intermittent fever (ague or malarial fever).
Epidemic cerebro-spinal meningitis.
Cholera.
Diphtheritic croup.
Whooping-cough.
Syphilis.
Tuberculosis.
Erysipelas.
Pyæmia (including puerperal fever).
Tetanus (lock-jaw).
Hydrophobia.

The last six of this list we shall consider by themselves, as they are separated by certain characters from the other fevers.

Characters common to all Fevers.

In all fevers there are observable distinct stages. These are named those of *Incubation*, of *Invasion*, of *Advance*, and of *Resolution*.

The stage of Incubation is that period, varying from a few hours in diphtheria to a few weeks in hydrophobia, which elapses between the time when the germ enters the body and the first commencement of urgent symptoms, the first appearance of the *distinctive* characters of fever. It

is not by any means easy to account in a satisfactory manner for the existence of this stage and its varying length, not only in different fevers, but sometimes in different specimens of the same fever. It is possible, moreover, that the same explanation might not cover all instances of fever. It is probable that only the spores of fever germs are generally consumed by the person who catches fever, and in such a case some little time must be allowed for their development in the body of the new host; or again it may be that fever symptoms are the result of the chemical products of fermentation, rather than of the presence of the ferments themselves, and some period will then elapse ere such accumulate in sufficient quantity to violently derange the health. We know, for a certainty, that in some diseases (*e. g.*, in gout), as sharp and acute in their onset as fevers, the special blood poison productive of the symptoms may accumulate for weeks, months, or even years in the blood ere it develops the acute attack. During the stage of incubation there is, as a rule, only vague general malaise.

The stage of Invasion commences with the more urgent symptoms. Of such, the commonest, given in their usual order, are rigors (shivering fits, felt mostly down the spine), headache, nausea or vomiting, a rapid pulse, a hot, dry, burning skin, loss of appetite, thirst, etc.—in one word, fever.

The stage of Advance can scarcely be viewed as anything but the direct continuation of the invasion stage. Symptoms continue, and fresh ones, among which often are skin eruptions, appear.

The stage of Resolution is usually held to date from the first commencement of improvement to the advent of convalescence, the cessation of the fever. In some fevers this stage occupies but a few hours. In typhus, for instance,

a fever patient will not unfrequently pass, in the course of three or four hours, from a very high state of fever to a condition in which all fever and symptoms of fever have passed away. This is called a *Crisis.* In most cases of fever, however, the improvement which marks the stage of resolution is slow and extends over several days. This latter termination of fever is said to be by *Lysis.*

The symptoms of fever are the results of the efforts made by the body to establish, in the presence of a novel force (the bacterium) or of a series of novel forces (the products of bacterial fermentation) a condition of equilibrium, a *modus vivendi.*

The treatment of fever consists—in the absence of any antidote to the fever poison—in judicious assistance rendered to the body in those efforts.

We will now briefly touch on the ordinary and more salient features of each of these disorders.

Simple Continued Fever.

Caused by a micro-organism, but favored by exposure, over-fatigue, and damp.

Characterized by:

(1) *A stage of incubation* of varying duration and marked by only trifling general malaise.

(2) *A stage of invasion,* marked by shivering and some nausea.

(3.) *A stage of advance,* lasting from a few hours to some days or even weeks, marked by the ordinary signs of fever, but *unaccompanied by any eruption.*

Resulting in recovery in nearly every instance.

It is neither contagious nor infectious.

Remarks.—The "fever and ague" of the tropics and "jungle fever" are often quoted as examples of this variety of fever. Each of them is, however, probably a

special and separate fever of malarial type. Many authorities ignore the existence of simple continued fever, asserting, and I think with very strong reason, that the so-called examples of this fever met with are really masked attacks of some one or other of the real fevers, or are mere general disturbances due to some internal, and not easily discoverable, inflammatory derangement, often of the nature of gastric catarrh.

Mumps.

Caused by a micro-organism.

Characterized by fever, *with pain and swelling of the parotid or other salivary glands.*

Resulting generally in recovery after a few days.

Remarks.—Mumps is propagated by contagion. Metastasis, or sudden change in the locality of the swelling, is sometimes seen in mumps: thus the enlargement in the neck may rapidly subside, while the testicles or breasts may as suddenly commence to swell. I have seen death result in the course of a few hours from a sudden change of venue from the neck to the membranes of the brain.

Influenza.

Caused by a micro-organism, developed during peculiar conditions of the atmosphere.

Characterized by sudden *chills*, great *prostration*, *frontal headache*, *aching of the limbs*, *sneezing*, and the general signs of a *catarrh* of the respiratory passages.

Resulting nearly always in recovery, which often is ushered in by an attack of diarrhœa.

Remarks.—The term influenza is often misapplied to an ordinary attack of catarrh. There is a wide difference between the two disorders. The early symptoms of influenza are those of a fever, and are always sudden and often alarming. It is usually *epidemic*, and affects, almost simultane-

ously, vast numbers of persons. Its course is short, rarely extending beyond a week. Its cessation is often sudden and marked by *diarrhœa* or *profuse sweating*. It contrasts therefore strongly with simple catarrh.

Measles.

Caused by a micro-organism.

Characterized by :

(1) *A stage of incubation* of from ten to fourteen days, in which only slight malaise is felt. Old-fashioned nurses often aver in this period that the child is "sickening" for something.

(2) *A stage of invasion*, marked by nausea, *running at the nose and eyes*, *intolerance of light*, and general discomfort, and lasting three or four days.

(3) *A stage of advance*, marked by the appearance first on the inside of the throat, and then on the face, and lastly on the trunk and extremities, of a raised *eruption*, at first *faintly purple* or pinkish, but gradually deepening in hue, accompanied, as the skin eruption becomes darker and more copious, by *cough* and *various chest symptoms*, largely due to the simultaneous presence within the bronchial tubes of an identical eruption.

After the first four days of this stage, the eruption, both internal and external, commences to subside, and, unless some grave complication has occurred, steady improvement commences.

Resulting in the vast majority of cases in prompt recovery, but sometimes, by reason of such not infrequent complications as pneumonia, bronchitis, pleurisy, whooping-cough, or diphtheria, in death or very protracted convalescence.

Remarks.—Measles seem to be most contagious during the period of invasion. "Peeling" occurs during conva-

lescence, the skin being shed in fine, branny scales. This disease has a strange affinity for whooping-cough, the one disorder not infrequently being immediately followed by the other. Deafness is a common sequence of measles.

Epidemic Roseola (German Measles).

Caused by a micro-organism.

Characterized by:

(1) *A stage of incubation*, lasting from five to fourteen days, marked by slight malaise.

(2) *A stage of invasion*, lasting from a few hours to four days, marked by nausea, general feverishness, *sore throat*, and *discomfort in the respiratory passages.*

(3) *A stage of advance*, marked, in addition to the last-mentioned symptoms, by the appearance, *first on the breast and arms*, of an elevated *rose-colored* rash, which often gradually gives place to a general *confluent redness* or to *large, irregular red patches.* This stage may last from four to sixteen days.

Resulting, nearly always, in recovery.

Remarks. — Epidemic rose-rash differs from measles mainly in the color of the eruption and the localities in which the rash first appears, while it contrasts with scarlet fever by the discomfort in the respiratory passages rare in the latter fever, by the absence of active vomiting in the stage of invasion, and by the ultimate course pursued by the rash. It is both contagious and infectious, and has a lower mortality than either measles or scarlet fever.

Scarlet Fever.

Caused by a micro-organism.

Characterized by:

(1) *A stage of incubation*, lasting from one to ten days,

and marked often by considerable general derangement of health.

(2) *A stage of invasion*, lasting from twelve to twenty-four hours, and marked conspicuously by *vomiting—which is usually severe and prolonged according as the attack is bad—sore throat*, headache, and a *very rapid pulse.*

(3) *A stage of advance*, marked by the appearance, *first on the chest and neck*, and then on the trunk and extremities, but rarely or never on the face, of a *red, diffused rash, apparently made up of an immense number of minute elevated points* (the papillæ of the skin), which becomes more general and takes a deeper hue during each of the first three days of its continuance. This stage is further characterized by a *bright red tongue* (the "*strawberry tongue*" of scarlet fever), a severely *inflamed condition of the throat*, which may ulcerate or be covered with diphtheritic patches, a *rapid pulse*, a *high temperature*, and general *nervous symptoms.* It lasts rarely more than ten or twelve days, by the end of which time the rash will generally have faded, and "peeling" of the skin, which usually comes away in largish flakes, will have commenced.

Remarks.—The following facts regarding scarlet fever must be borne in mind. It is eminently contagious and infectious. The severity of the attack, which may generally be gauged by the early symptom of vomiting, varies in different cases, and different epidemics differ widely in their mortality. Thus scarlet fever may either present itself, in extreme cases, as an exceedingly mild disorder, and as such may even be unaccompanied by any rash, or as a highly malignant fever, fatal in a few hours and even before any rash has had time to appear. All forms of it, however, the mild and the severe, may be followed by inflammation of the kidneys, which may pass into a form of *chronic Bright's disease.* The lymphatic

system often suffers severely during the continuance of the fever, as evidenced by inflammation of the lymphatic glands, and of the great lymphatic spaces that encircle the bowel, the lungs, the heart, and the brain. *Peritonitis*, *pleurisy*, *endocarditis*, *pericarditis*, and *meningitis* are thus not unfrequent complications. *Severe rheumatism* is, as we should naturally expect in a fever which attacks frequently in a special manner the lymphatic system, frequently observed, while *disease of the middle and internal ear*, ending sometimes in permanent *deafness*, and caused by a direct extension to those parts of the inflammation which commences in the throat, is also a common sequel of the disease.

Scarlet fever is especially fatal to lying-in women, who are, moreover, remarkably prone to contract it. In the case of children, the scrofulous, whose lymphatic system is always their weak point, are most prone to succumb to the attack.

Typhoid Fever.

Called also *enteric fever*, *gastric fever*, *gastro-bilious fever*, and *low fever*.

Caused by a micro-organism, which is most readily developed in localities such as cesspools, and badly flushed or defective drains, where human excreta collect, and where the temperature rarely falls low, and to which fresh air has no ready access. Once developed, the bacterium of typhoid travels by means of water, milk, or other articles of food contaminated, but probably never by the air. This fever germ is therefore non-volatile, and cannot be communicated by the atmosphere of the sick-room, and probably not even by the vapor-charged breath of the sufferer.

Characterized usually by three well-marked stages, but

exhibiting in its method of attack, in its course and severity, and in its duration very wide differences.

(1) *A variable stage of incubation*, marked usually by a *peculiar weakness of the legs*, by some *flatulence, frontal headache*, and general malaise; often by *deafness.*

(2) *A stage of invasion*, marked, in the majority of cases, by severe *frontal* headache, nausea and *vomiting*, prostration of strength, high fever (*worse at night*), distension of and *gurgling in the abdomen*, with distinct *pain on pressure* in the lower right-hand corner of it (the right iliac fossa), and, in about 5 per cent. of the cases, by a brilliant rose-colored rash lasting for one, two, or three days.

(3) *A stage of advance*, marked for a time (one to two weeks) by the occurrence, in 90 per cent. of the cases, of frequent and offensive *diarrhœa*, the stools being very liquid and of a characteristic *mustard hue;* by the appearance of a *faint and usually very scanty rose-colored rash*, best seen in the neighborhood of the navel; by *high nocturnal fever*, with generally a marked amelioration in the early part of the day; by profuse night-sweating; by great abdominal distension, and often by extreme loss of power, the patient lying in an apathetic state *on his back*, the lips and teeth covered with dry and often black mucus, the skin exhaling an earthy odor, and *the pupils widely dilated.*

Towards the end of this stage, gradual improvement in all the symptoms is witnessed, and by the end of twenty-one to thirty days from the date of invasion all fever has usually subsided.

The stage of convalescence is a long one, and short relapses, lasting each for two or three days, are very common.

Remarks.—It is almost impossible to do justice, in a

very limited space, to a subject such as typhoid fever, for so diverse are often the earlier symptoms that a mal-diagnosis may easily be made by the most experienced men. The sketch I have given is that of a typical attack.

The characteristic swelling and ulceration of some of the glands in the intestine (the co-called Peyerian groups and the solitary glands) introduces an element of danger from perforation of the bowel and *peritonitis*, in this fever, absent in all others. Copious hemorrhage from the bowel, rendered more than usually dangerous by the abnormal fluidity of the blood, is not an infrequent cause of death, while sudden and violent bleeding from the nose may be fatal ere help can arrive. Several years often elapse ere the patient's health is completely restored, and during this period the risks of an attack of consumption are always great.

Typhoid fever is known under various names, in every country, while in certain towns or portions of towns it is, owing to faulty drainage, endemic, attacking, as do all fevers, most readily the new-comers. *The pulse in typhoid is rarely very rapid;* its rate, in mild cases, may even be normal during the greater part of each day.

Typhus Fever.

Caused by a micro-organism bred by overcrowding, accumulations of filth, and other grossly unsanitary conditions, and propagated readily both by the air and by solid and liquid articles of food.

Characterized by:

(1) *A stage of incubation*, marked sometimes by *headache*, *deafness*, and *unsteadiness of gait*, but often by none of these discomforts.

(2) *A stage of invasion*, lasting three or four days, the commencement of which is indicated by the *sudden acces-*

sion of severe chills, vomiting, intolerable *general headache,* a marked *contraction of the pupils,* a *flushed face,* a *rapid and full pulse,* a *rapidly rising fever* showing no morning abatement, and often *great disturbance of the nervous system,* which sometimes takes the form of depression, sometimes of excitement.

(3) *A stage of advance,* lasting about ten days, and marked throughout by *high fever,* a *quick pulse, contracted pupils, great restlessness,* and maniacal excitement, *constipation,* and by a copious *mulberry-hued rash,* not unlike that of severe measles, but deeper in color, more persistent, and tending to run into large patches and to be intermingled with peculiar *bruise-like spots* (*petechiæ*) due to extravasations of blood under the skin.

Remarks.—Jail fever and ship fever were forms of typhus, as were also the Black Plague and the Black Death, so called from the peculiar darkness of the eruption, the frequency of the bruise-like extravasations of blood, and the color of the vomit, blackened by blood effused into the stomach—for both in typhus and typhoid is there, from the alterations in the blood, a strong tendency to hemorrhage. In these very severe forms of typhus the lymphatic system became, as in malignant scarlet fever, much affected, and the swelling of the lymphatic glands of the body gave rise to those swellings, called plague buboes, which formed a marked character of the disease. Like scarlet fever, typhus is usually contagious in proportion to its severity.

While the general dissimilarity, except in name, between typhoid and typhus seems marked, it cannot be doubted by those who have seen much of both fevers, that, occasionally, there seems to exist a close relationship between them. When engaged in studying fever in the East-End slums of London, I have, over and over again,

seen isolated cases of typhus appear in the midst of a typhoid epidemic, and even the characteristic rash and symptoms of typhus replace the last stages of what had, to all appearance, previously been a typical typhoid fever.

Typhus has become, in modern times, a comparatively rare European disorder.

Famine Fever (sometimes called *Relapsing Fever*).

Caused by a micro-organism, developed under certain conditions, the principal of which are destitution and dirt.

Characterized by :

(1) *A stage of incubation*, with no symptoms.

(2) *A stage of invasion and advance*, lasting for about five days, and marked by high fever, *vomiting*, and *pain in the back*, and sometimes by *slight jaundice* and bruise-like spots, but by *no rash*.

(3) *A stage of recovery*, which sets in promptly, and is often ushered in by *copious perspiration*.

(4) A *stage of relapse*, during which for a few days the fever returns.

It results nearly always in recovery.

Remarks.—It appears only as an epidemic in times of great and widespread want.

Yellow Fever.

Caused by a micro-organism, developed under certain unknown conditions, but those in which a prolonged high temperature and the presence of much moisture seem essentials.

Characterized by an *abrupt commencement* of all the general signs of fever, to which are added *severe headache*, urgent *vomiting*, the *vomit being often black* from effusion of blood into the stomach, *aching of limbs and of back*, great *irritability of stomach*, the passage of dark red

or of almost *black urine*, slight jaundice, *delirium*, and great *mental anxiety*. At the end of two or three days these symptoms generally subside, and recovery may take place, but, more generally, this improvement is but of short duration, and is succeeded by a return, in a much aggravated form, of all the symptoms, which then end in death.

Remarks.—The mortality of yellow fever varies with the race and with the nature of the epidemic. Negroes are rarely attacked, and then, as a rule, but mildly; the natives suffer much less from the disease than do the more recent arrivals. In bad epidemics the mortality is sometimes as high as one in three.

Dengue (Dandy or Breakbone Fever.)

Caused by a micro-organism.

Characterized by a sudden onset of chills, followed by fever, with headache, nausea, and *intense pain and swelling of all the joints*, and by the appearance, on about the third day, of a *peculiar rash* on *the palms of the hands*, which *itches intensely and spreads rapidly over the whole body*. The fever present is of a remittent character.

Remarks.—The dengue occurs only in tropical countries, and as an epidemic. Though an exceedingly painful, it is but seldom a fatal, affection, and rarely lasts longer than a week. Convalescence is, however, often slow.

Small-pox.

Caused by a micro-organism capable of transmission by air, liquids, or solids.

Characterized by the following well-defined stages:

(1) *A stage of incubation*, lasting from ten to fourteen days, and marked by no distinct symptoms.

(2) *A stage of invasion*, lasting two or three days, marked chiefly by *intractable sickness*, *severe headache*, and *fever*.

(3) *A stage of advance*, marked during the first four or five days by a subsidence of the fever and the gradual appearance, *first on the forehead* and face, and then on the trunk and extremities, of an *elevated eruption of pimples* which steadily increase in size till matter is formed in the apex of each. This maturation occurs on or about the fifth day of this stage, and, coincidently with it, the fever rises for two or three days, at the end of which time the pimples burst and discharge matter which dries and forms crusts.

(4) *A stage of subsidence*, ending in recovery, during which the scabs fall, leaving scars.

Resulting, in those protected by vaccination, generally in recovery; in others, especially in the black races, very frequently in death.

Remarks.—A blood poison, such as that of small-pox, which expends its violence so largely on the skin of the body, may be safely predicted to be dangerous in proportion to the extent of the inflammation it produces, for the functions of the skin are so important that grave mischief must always accompany an extensive interference with them. According to the abundance and the closeness of the rash is therefore always the danger. The evidences of such danger will moreover be rationally sought in organs similar in function to the skin, and on which the greatest strain must, when the skin function is in abeyance, most naturally fall. These are the lungs and kidneys, *pneumonia*, *bronchitis*, and *acute kidney mischief* being the forms which the complications generally assume. As in all fevers, however, the blood poison may itself be so virulent and abundant as to destroy life within the first

few hours of an attack, and even before the skin has had time to become affected.

The Question of Vaccination.

I have always found it, and still find it, difficult to believe that any one who has been actively engaged in the capacity of a medical man, during an epidemic of small-pox, can honestly doubt that efficient vaccination is an almost certain preventative of the disease. I am, therefore, a firm believer in the efficacy of vaccination. To uphold universal and compulsory infant vaccination is, however, another and very different matter, and one to which I am certainly opposed, and that on the following grounds: Firstly, because it has never been proved that the mildness of modern epidemics of small-pox is traceable *solely*, as has been ofttimes stated, to the influence of vaccination; nearly all febrile diseases tending after a time to assume milder forms. Secondly, because it is irrational to bestow, compulsorily at any rate, on *every* child, a disease, such as is vaccine-pox, which, though undoubtedly mild, is not without both temporary and permanent influence on the health of the body—for it must have *some* permanent influence if permanently protective—in view of the fact that, even in pre-vaccination days, not more than one in fifty of the inhabitants of these isles was attacked by the disease; and in this connection it behooves us furthermore to remember that, spite of the universal application by law of vaccine-pox, the complaint for which it is a substitute has by no means been wholly banished from the land. Thirdly, because vaccination, while practically universal, is not unfrequently inefficiently performed, or fails to protect completely because not often enough repeated—in short, because the stamp left on the body by ordinary vaccination in childhood, deep as it is, is yet not

deep enough. Fourthly, because the mortality from *all* the epidemic and other fevers combined has not actually fallen since vaccination was introduced, or, if we admit with some statisticians, that a slight fall has occurred, not more than can easily be accounted for by improved measures for the detection and arrest of epidemics and for the treatment of the sufferer. And even if we could banish forever the fevers from our midst, as long as men are herded together, and the population of already overcrowded countries is allowed recklessly to increase, so long must and will a high mortality be maintained, while of the three means by which over-population is kept in check—war, want, and pestilence—the latter is, as regards the good of the race, not unfrequently the best for humanity, since it picks off generally the least healthy—those least able to equilibrate under difficult conditions; while want often tells disastrously both on the sound and the weak; and war selects, by preference, for its victims, the prime specimens of humanity.

Did space permit I could easily supply many more cogent reasons against the compulsory and inefficient vaccination as carried out in England, but I have already said sufficient to support the conclusion to which personally I have long since arrived, that the power of efficient vaccination to avert small-pox is so absolutely certain that the element of compulsion can but injure its recognition, by leading first of all very frequently to its inefficient performance, and by raising a suspicion as to its real utility in the minds of people who see it so greedy of extraneous support.

Chicken-pox.

Caused by a micro-organism.

Characterized by about twenty-four hours of *mild fever* and then by the sudden commencement, on the *second day*,

of an eruption, which may *begin anywhere* on the surface of the body, of red pimples which in three or four days become crowned with a minute vesicle of *clear* fluid (hence the term glass-pox) which is discharged and leaves a crust, but *little or no scar*, behind. The eruption generally comes out in *successive crops*, not all at once as in small-pox.

Resulting in recovery.

Remarks.—It is not by any means always easy to determine the difference between mild small-pox and severe chicken-pox.

On the special characters of the former which I have italicized must the decision be largely based.

Remittent Fever.

Caused by a micro-organism bred in marshy districts.

Characterized by all the symptoms of intermittent fever to be presently described, with the exception that, in remittent fever, the febrile condition *abates*—but never vanishes, as in the intermittent form—during regular intervals in the course of the attack.

Resulting, as does the intermittent form, often in partial, rarely in complete, recovery, and sometimes in death.

Intermittent Fever or Ague.

Caused by a micro-organism, developed in marshy districts.

Characterized by certain well-marked stages:

(1) *The cold stage*, which commences with severe shivering extending over the whole body, and usually to the extent of teeth-chattering. Though the sufferer complains of intense cold, the bodily temperature is actually raised—*i. e.*, fever is really present, during this stage, which lasts from half an hour up to three or four hours.

(2) *The hot stage.*—This follows immediately on the

first stage and lasts from three to twelve hours. During its continuance the sufferer has all the symptoms of a high fever.

(3) *The sweating stage.*—This succeeds the hot stage and lasts a few hours, ending in complete relief.

Resulting, rarely directly in death, but tending, unless the patient removes promptly from the malarious situation, to frequent recurrence and permanent ill-health.

Remarks.—The type of fever, determined by the interval of perfect health, is variously named. Thus when *every* day at a fixed hour the shivering sets in, the ague is said to be a *quotidian;* when every second day, it is called a *tertian;* when every third day, it is said to be a *quartan* ague.

Intermittent fever covers, by a single term, a vast number of malarious fevers, some of much greater severity than others, but always marked by the same three stages. They are all endemic, but none are transferable from individual to individual.

The place of attack selected by the micro-organism of ague seems to be some portion of the stomach or bowel, for both its temporary results and its permanent after-effects are restricted to the abdominal cavity, and almost solely to two organs situated therein, the liver and the spleen.

Some years ago the writer advanced a theory to account for the periodicity of the attacks—namely, that the micro-organism was absorbed by the bowel, and on reaching the liver set up therein a disturbance of which the shivering, heat, and sweating were symptoms; that its ejection back into the bowel with the bile led to the cessation of the fever, and its reabsorption again by the bowel to a recurrence of the attack. That swelling of the liver marks the attacks, that a return to its natural size is coincident with its cessation, and that purgatives have a markedly cura-

tive effect in this fever, are three points universally conceded, and are those upon which the theory is mainly founded.

Oft-repeated attacks of ague lead to permanent enlargement of the liver and spleen, and to a corresponding impairment of their functions.

Cinchona-bark and its derivative quinine, have, it is well known, a remarkable power in checking and preventing ague, being probably destructive of the micro-organism. *Warburg's Fever Tincture*, a combination of cinchona-bark with aperients and carminatives, is a singularly good preparation. When the functions of the spleen have been gravely impaired by repeated attacks the blood is apt to become much impoverished (the spleen being a blood-forming gland), which state of matters iron and arsenic seem to possess the power of improving.

Epidemic Cerebro-spinal Meningitis.

Caused by an unknown micro-organism.

Characterized, first by *rigidity of the head and neck*, *shivering*, *prostration*, and then by *extension of pain over the whole body*, the appearance of a peculiar *typhus-like eruption ;* these symptoms often being quickly followed by convulsions, suppression of urine, insensibility, and death.

Resulting, most frequently, in death; rarely in complete recovery.

Remarks.—This fever is an exceedingly rare one, appears always as an epidemic, and is probably not contagious.

Cholera (*Asiatic Form*).

Caused by a micro-organism.

Characterized by three well-marked stages :

First stage—that of incubation—during which the com-

monest symptoms are *nausea* and *copious, frequent,* but *painless purging.* This stage may last two or three days, but its duration is usually limited to three or four hours.

The second stage—that of attack and advance—suddenly replaces the first. The character of the stools now alters from that of an ordinary bilious character to that of the peculiar consistence and hue of *rice water.* The *kidneys cease to act. Cramps* commencing in the abdomen spread to the muscles of the extremities, causing *horrible contortions* of the body. The face and the whole surface of the body become *dry, muddy-looking,* and *wrinkled;* the body of the sufferer seems to have visibly *shrivelled* and grown smaller. The voice becomes *feeble and whispering,* and the pupils *closely contracted.* The intellect, however, is clear.

Third stage.—The advent of the third stage—when the sufferer has survived the second or collapse stage—is ushered in by an apparent all-round improvement. The stools lessen in frequency, the pulse returns to the wrist, the temperature of the body, hitherto subnormal, rises, and the cramps become less severe. In some cases this improvement is maintained; in the majority of instances, however, the suppression of urine continues, and this latter paralysis of function is probably the greatest factor in the production of the successive symptoms of *headache, drowsiness, convulsions,* and *coma* which ensue, and which nearly always terminate in death.

Remarks.—The best authorities seem of accord as to the non-communicability of Asiatic cholera by the breath or by contact. Both the vomit and the dejecta, however, contain myriads of the special cholera micro-organism, and probably some, but certainly not many, may thus become diffused in the air; the great carriers of cholera being fluids, and especially drinking-water. This cholera,

while one of the most terrible of epidemic fevers, is, at the same time, the one that, with care, can most easily of all be avoided.

Irregularities of diet, intemperance, exposure, and exhaustion seem to predispose to the disease.

Of the special plans of treatment, and they are many and diverse, recommended in cholera, that by small and oft-repeated doses of castor oil is, as statistics show, and as indeed one might have predicted, the best.

The intense drain of water and salt from the body, for the rice-water evacuations contain an abundance of common salt drawn from the blood, is undoubtedly one of the great secondary dangers to be feared, and is oft to be adequately met by the injection into the veins of these substances. The improvement which almost immediately ensues on this artificial restitution to the blood-current of these important constituents is remarkable, but the drainage away of them is, especially in the second stage of the malady, so rapid that, to be really efficacious, such injections must be frequently repeated.

Cholera (*English Form*).

Caused, probably, by some micro-organism akin to that of Asiatic cholera, but, on account of the comparatively low maximum summer temperature of Great Britain, never developing sufficiently to constitute an equally violent poison.

Characterized by two stages:

First stage—that of incubation—often lasting but a few hours, and marked by *sickness*, fever, and *ordinary diarrhœa.*

Second stage—that of advance—during which the *purging becomes exceedingly frequent*, the stools containing much water and often an abnormal amount of common

salt, but being never of the rice-water character. *Cramps* in the abdomen are frequent and severe, and sometimes extend to the extremities. The functions of the kidney are *impaired.* The *skin shrivels*, the face becomes *contracted*, and the complexion *muddy-looking.* In children *convulsions* are often witnessed, and are always an indication that the disease is likely to prove fatal. In fatal cases, *insensibility* sets in towards the end.

Remarks.—This disease, known also as epidemic summer diarrhœa, is one of the greatest scourges of infancy. It commences usually in July and lasts during the remainder of the summer heat, the epidemic declining always with a fall in the temperature. Children are far more prone than are adults to the attack, but those of them who draw their nourishment exclusively from maternal breasts are singularly free. In the young the attack is often of a fortnight's duration, and the convalescent period which ensues may last even longer. As in Asiatic cholera, treatment by means of mild purgatives, rhubarb or castor oil, is by far the most efficacious, while ordinary salt and bicarbonate of sodium may also with advantage be freely administered to counteract the drain from the body of the sodium compounds. In adults the disease runs a short but sharp course, a copious dose of castor oil, followed sometimes by a few doses of diluted sulphuric acid, combined, if need be, with a little chlorodyne, usually sufficing to restore the sufferer rapidly to comfort. In the aged, while the same course of treatment is generally successful, death may result from the prostration which accompanies the profuse diarrhœa or from the intensity of the abdominal pains.

Diphtheria and Croup.

To the student versed in the lore of the shorter medi-

cine-made-easy treatises, the above conjunction of what he has been taught to regard as two distinct diseases will appear heterodox.

But the ordinary classification, founded as it is mainly upon the contrast often presented between the symptoms observed in cases of diphtheria that attack mainly the windpipe and the larynx, and called membranous croup, and those of other instances of the same disease in which the higher regions of the throat alone bear the brunt, cannot hold its ground; for such an argument would tell with even greater force for the severance of two common sub-varieties of diphtheria—the endemic and the epidemic —which present in their course and their fatality even greater divergence.

The fact of the matter is, that diphtheria, like scarlet fever, may exhibit various degrees of virulence, and, like Asiatic cholera, may exist in an endemic and scarcely dreaded form, or in the epidemic and most terrifying shape.

Diphtheria is caused by a micro-organism, often of little virulence when developed in damp, clayey soils, rich in decaying vegetable matter, and endemic in its character, but of great power for evil when originating in connection with animal excreta from which air has been largely excluded and of the epidemic or the sporadic kind.

Characterized by two stages:

First stage — that of incubation — lasting probably not more, in the majority of cases, than twenty-four to forty-eight hours, and marked sometimes by no symptoms, but often by considerable nervous prostration.

Second stage—that of attack and advance.—The advent is *very sudden*, and marked, in nine tenths of the cases, by chills, *aching of the limbs*, severe and *characteristic pain in the small of the back*, and *extreme prostration*. To

these usually succeeds *sore throat*, often but little, and sometimes not at all, complained of. The appearance of the throat is characteristic. The tonsils are swelled, and on them, and sometimes all over the throat, are seen patches of what looks like dirty white blotting-paper, the characteristic *diphtheritic membrane*. If the attack be violent, the *glands* at the angle of the jaw will commence to swell, and, as in scarlet fever, in proportion to this swelling will the disease often be found to be dangerous. Accompanying these symptoms there is an extreme and *characteristic prostration*, the perspiration often streaming profusely from the face, and the patient complaining of extreme faintness and inability to sit up. The temperature of the body will, as in cholera, be found often to be *subnormal*, remaining for days at 97° F., or even 96° F. The heart's action is feeble, and sometimes irregular. The functions of the kidneys are often partly arrested, the urine containing much albumen, and the perspiration of the body having a peculiar urinous smell.

In mild cases this stage does not last more than two or three days, though even then recovery from the extreme prostration is exceedingly slow. In severe cases death from paralysis of the heart or lungs is common during this stage, which may extend for a week or a fortnight; while, when recovery occurs, the subsequent convalescence is apt to be a matter of weeks or months, or even of years. Chronic disease of the kidneys or permanent debility of the nervous system may be set up as a consequence of the disease.

Remarks.—Epidemic diphtheria often commences in a country-house drained into a cesspool. It spreads rapidly, especially by means of fluids, such as milk or water. It has a high mortality, killing from 50 per cent., upwards, of its victims. The glands of the neck are always en-

larged. The membrane extends rapidly down the windpipe, often even into the lungs; it may affect the surface of the eyes, the entire inner lining of the nose, and be sometimes seen covering any part from which the skin has been removed — as, for example, by a blister. Often it will spread to the trachea and larynx very rapidly, the preceding throat mischief escaping notice. When children are thus attacked, a set of symptoms known as those of *croup* ensue. Epidemic diphtheria is apt to be complicated or followed by a series of paralytic symptoms. It is highly infectious.

Endemic diphtheria prevails over large districts of towns, especially where the sub-soil is of clay and the houses have been built on made soil containing much animal and vegetable refuse. It is far more common in autumn, winter, and spring than in summer. The attack is brief but severe, lasting usually from two to five days. It is but rarely fatal, travels by milk and water, but is certainly not directly transferable.

In connection with croup, it is important to remember that a congestion of the trachea and larynx producing all the symptoms of diphtheritic croup is not uncommon, especially as a first symptom in measles. This is a simple laryngitis unaccompanied by any membrane. Again, spasm of the glottis, child-crowing or **False Croup**, a common reflex symptom in children during the period of teething, or a consequence of intestinal worms, generally recurrent and but rarely fatal, must not be confounded with the exceedingly dangerous disease, real diphtheritic croup.

Whooping-cough.

Caused by a micro-organism of an unknown kind.

Characterized by two stages:

First stage, marked by the symptoms of an ordinary cold and by a *cough*, which is usually *worse at night.*

Second stage, the cough becomes *spasmodic* and characteristic of the complaint. In the intervals between the acts of coughing — if no complication be present — the sufferer is quite well. The duration of this stage is variable and depends largely on atmospheric states, rarely ceasing as long as the weather remains damp or cold; hence the popular idea that this affection does not get well till the month of May.

Resulting, if of a mild and uncomplicated form, such as may occasionally be seen during a dry, hot season, almost invariably in recovery; but if of a severe type, and the sufferer be delicate or exposed to sudden changes of temperature, often in complications which imperil life.

Remarks.—The frequent repetition of a violent cough such as is that of whooping-cough, constitutes in itself a grave danger. The strain thrown by it on the blood-vessels of the head is visible in the swollen and turgid face, the *bloodshot* eyes, and the not infrequent *bleeding from the nose.* These are of trifling import, but the pressure on the circulation in the brain is of a serious kind, and may even end in an effusion of serum into the ventricles of that organ and thus to *convulsions* and death, a by no means uncommon termination of the disease. The violence done to the lungs—which are not themselves, primarily at any rate, the seat of disease in this complaint—may also end in severe secondary mischief, of which *bronchitis*, *chronic dilatation of the bronchial tubes* (*i. e.*, *bronchiectasis*), or of the air-vesicles (*i. e.*, *pulmonary emphysema*), or obstruction of some one or more of the bronchial tubes, leading to *collapse of a portion of the lung*, are perhaps the commonest; while *pleurisy* and the *capillary variety of bronchitis*, both very formidable complications, may also be occasioned.

General Principles on which the Treatment of the Fevers, thus far described, must be conducted.

The reader will consider it high time that I should give some directions for the prevention and treatment, if not for the cure, of the long list of blood diseases due to micro-organisms, which we have discussed.

I have stated somewhat dogmatically that each of those complaints is caused by a micro-organism, a fact quite beyond dispute in some cases, and in every case advancing rapidly to actual proof.* Surely if this be so the treatment should consist in finding for the micro-organism a poison which can be absorbed into the blood, and that shall at the same time be harmless to the host. Now we possess, in point of fact, a goodly array of such substances, none of which, however, when introduced into the vital stream, has any effect in checking the advances of the fevers. Why is this? Probably because the symptoms of fever are rather the result of poisoning from the disintegration of albuminoids dependent on, but subsequent to, the fermentative process set up in the blood-stream by the micro-organisms, than the phenomena dependent on an active struggle between micro-organisms and living cells.

On this latter theory the fermentation would take place during the so-called stage of incubation, a period which, when carefully studied, is always found to be marked by some symptoms; the poisoning by the albuminoid débris (in any case violent poisons) corresponding with the active stages of the attack.

* The reader who wishes for a careful, scientific, and full explanation of the point which these discoveries have now reached should read the Harveian Oration, delivered in October, 1888, by Dr. Latham, than whom there is no medical authority so cautious, impartial, accurate, and therewithal so philosophical.

Whichever theory be correct, it is absolutely certain that, with the possible exception of quinine in ague, we possess no real antidote whatever to any fever poison.

The precautions to be observed in the avoidance of fever are almost too well known to need mention. The general bodily health must be maintained, for it is true of at least the larger number of fever germs that they have little power of attacking a really healthy individual, and that such a one, even if he falls a victim, stands a good chance of recovery. Then again we know, as a general truth, that fever germs flourish best in a warm atmosphere, poor in oxygen but rich in organic particles given off by the bodies of men and animals. Fresh, dry air is therefore the best of preventatives, and the avoidance of close rooms and densely inhabited parts of large towns is imperative. There is no proof that the evil-smelling disinfectants so often used in the sick-rooms of the fever-stricken, and which usually inconvenience and sometimes seriously disturb them, are of any service at all.

For my own part, I simply recommend the manufacture in the sick-room of ozone, which can be easily carried out, either in the manner recommended by Dr. Fox ("Ozone and Antozone," p. 25) by the gradual admixture of three parts of oil of vitriol with two parts of permanganate of potassium, or by heating a platinum wire by a Bunsen cell. Oxygen water may also be freely consumed.

Undoubtedly it is a rational thing to administer an efficient purge at the very earliest date at which the existence of a fever poison in the body is suspected. Of all purgatives none at such a time excels calomel. Two to five grains of this substance may be placed at night on the tongue of infant or adult, and followed in ten hours by a dose of some simple saline. In the commencement of typhoid fever, typhus fever, scarlet fever, epidemic roseola, and English

cholera, this course seems, as far as one can judge, to be followed by happy results, and indeed it is often in these complaints advisable to repeat the dose each night for three or four times. The best way to treat the nausea and sickness, such an early and oft-distressing symptom in fever, is to encourage it by administering, every three or four hours, one drop of ipecacuan wine in a wineglassful of very hot water. The headache is also most readily relieved on the same paradoxical lines, hot flannels or gentle friction with oil of cinnamon being more serviceable than cold-water coils or ice-caps, though, when the headache seriously interferes with sleep, and other methods fail, the latter may be given a trial.

Once under way I do not think that, in the present state of our knowledge, it is justifiable to make attempts to arrest the fever. Such experiments are always dangerous to the patient, however flattering to the hopes of the patient's friends. I know the difficulty of an "attitude of masterly inactivity" in fever, but I have never been disappointed in its results, nor known disapproval of the course expressed by intelligent people. Remembering the very narrow limits within which absorption by the bowel in fever is possible, it is always advisable to see that the intestine is not allowed to become clogged with offensive fermenting matter. To this end there is no drug equal to castor oil, a dessertspoonful or more of which, mixed with 15 grains of bicarbonate of sodium, and administered in 2 or 3 oz. of peppermint water, forms an easily taken draught. Even when, as may happen in all fevers, and does occur in the vast majority of cases of typhoid fever, diarrhœa is present, a teaspoonful of castor oil with two drops of the oil of eucalyptus, given once or twice a day, usually succeeds far better in rectifying efficiently the intestinal irritation, and thus arresting safely the flux, than do astringents. If,

however, one of the latter class must be administered, choice should be made of the mineral acids freely watered, and of these the dilute aromatic sulphuric acid given every four or six hours in doses of fifteen to twenty drops in an abundance of water is the best, according to my experience. A daily warm bath, where this can be tolerated, or the sponging of the surface of the body twice a day with tepid water, are measures always useful, except in cases of measles and scarlet fever when, with severe general symptoms, the rash is scanty and its retrocession to be feared. When the throat is sore there is no such comfort to be obtained as that from swallowing ice, and I have seen hundreds of small-pox cases satisfactorily treated in hospitals where an unlimited allowance of ice to check the exasperating soreness of the throat was the only means of treatment adopted. An abundance of fluid (*i. e.*, water) may generally be permitted in fever. It has the effect certainly of flushing the kidneys without acting as a stimulant to them, and it furthermore constitutes, to a slight extent, and in an indirect way, a nourishment. My experience is that the less a fever patient is drugged the greater is his chance of life, but that, if active treatment must be undertaken, it should be on the lines of a humble and cautious following of Nature as she is seen working in the symptoms of disease.

Nursing and dieting are matters in fever that should, however, always engage our attention. There are a hundred little ways in which a skilful nurse may materially assist in the recovery of the patient. On the question of dieting it is of the utmost import to remember that denutrition and disintegration, not assimilation and repair, are the bodily processes that mark all fevers. This cannot be altered. You may supply albuminous foods in the form of light soups, especially fish and cheese soups, and such

albumen will be useful, not because it can repair cell waste, but because it, like all albumen, can undergo a certain slow oxidation in the body, and thus perhaps save the combustion of the tissues. Meat essences again contain stimulating properties often of service. They should, however, be administered very sparingly indeed, or the kidneys will suffer. Where the loss of flesh is rapid, alcohol, in *very small* and *regular* doses, is of the greatest service. A teaspoonful of the best brandy or whiskey every four or six hours, well diluted, answers all useful purposes. Given in larger doses to rouse the pulse and heart, it is a dangerous poison, whipping up and prematurely exhausting the already flagging circulation. Milk, when the stomach is not too gravely deranged, is an excellent food, but when it is given the motions must be carefully watched, and if green evacuations and undigested curds are seen it should be discontinued. In children with fever I have often seen violent convulsions ensue from the presence in the intestine of these hard curds. In many bad cases coffee and tea are of great service and may be freely given. Fats are rarely tolerated, but are useful in the exceptional cases in which they agree, butter and cream being the best forms. The starches are badly borne as a rule, but in mild fever, well-cooked farinaceous puddings, without eggs, are often digested. There is usually present, even in children, an instinctive dislike in fevers to anything sweet, but an effort should always be made to coax the sufferer to take grape-sugar or milk-sugar; the former may be given as an extract of malt, which is nearly always pure grape-sugar and nothing else —but, as such, an excellent body fuel—the latter in the form of whey, which fluid contains, in addition to milk-sugar, many highly useful salts. Sour buttermilk is often well tolerated in fevers and is a useful food. In mild

fevers, if diarrhœa be not present, grapes may be allowed and usually agree well. Beverages made with fresh fruits, but *not* sweetened with cane-sugar, are certainly useful, containing, in the form of grape-sugar and various salts, useful nutriment. Maigre soups, containing only traces of solid vegetables, are often to be highly commended.

Such are the general rules for all ordinary attacks of such fevers as we have considered. Complications as they arise must be met on the ordinary principles; firstly, by trying to arrest the causes of their production; secondly, by gently favoring the development of the symptoms.

We now come to the consideration of the second group of fevers, differing from the ones we have just considered by the fact that—with the exception possibly of tuberculosis and of some milder forms of erysipelas—these latter are communicable only by inoculation, and not by way of the stomach or the lungs as was the case in our first group.

Syphilis.

Caused by a micro-organism.

Characterized by three well-marked stages:

First stage—that of incubation. This may last from ten to forty-six days, or even longer, and is characterized by no definite general symptoms.

Second stage—that of attack. This is sometimes called simply "primary syphilis," and is marked by the appearance at the seat of inoculation of a hard but commonly *painless excrescence* or ulceration, by the general characters of mild fever, shivering, headache, loss of appetite, and *general malaise.* A mild sore throat is also generally present.

This period may last from a couple of weeks up to a month or more.

Third stage—called "secondary syphilis"—is marked by swelling of the lymphatic glands in the neighborhood of the site of inoculation, *acute sore throat, an eruption* which varies much in character and severity, but which usually is of a faint *roseolous hue,* and general symptoms of fever of a more severe type than those witnessed in the earlier stage. Peculiar superficial ulcers, like snail tracks, often appear on the tongue and gums, and larger but similar patches are seen commonly on the throat. Soft warty outgrowths and fringes (condylomata) are also often seen on the mucous membranes of the body.

During this stage, which may last for some weeks or months, the eye is not unfrequently attacked by various inflammatory symptoms, of which iritis is the most common.

Remarks. — With the termination of the secondary symptoms the disease may finally vanish. At any rate it then ceases as a fever, and is *no longer contagious,* but in the vast majority of cases, unless the standard of general health is well maintained, a great number of symptoms, which may select any organ, will bear evidence to the radical mischief done to the body by this fever. It is the lymphatic system on which the brunt of disease falls, and therefore in syphilis, as in scrofula, it is in the organs of that system, and in its nearer dependencies, that the evil sequences thereof are most apparent. Rheumatism is thus a common sequel. It would be impossible to attempt an enumeration of even the more ordinary degenerative consequences of this disease, so various are they. The brain, the spinal cord, the bones, the lungs, the heart, the liver, the spleen, the kidneys, the eyes, the ears, the throat, the larynx, the skin (very frequently indeed) may each or all become, on the least decline of health, or even independently of that, and five, ten, fifteen, or twenty years after the fever has ceased, the seat of dis-

organization. Worse still, the sufferer will transmit his often fatally undermined system to his offspring, in whom the taint will appear in the first few weeks of life, and whose whole life may thereby be crippled or prematurely terminated.

Treatment.—While not denying for a moment the unchallengeable power possessed by mercury of causing the symptoms of primary and secondary syphilis to disappear, I am at one with the large band of medical men, many of them eminent specialists, who regard the administration of this mineral, except temporarily to combat some grave and advancing lesion of an important organ, as a mistake in the long run.

The man who takes the salts of mercury purchases a large immunity from the troublesome, but rarely dangerous, symptoms of primary and secondary syphilis, at the risk of the permanent ruin of his health and of grave and often fatal after-consequences. Patience, and the adoption of such general principles of treatment as I have indicated as suitable for feverish states, should at least always have a fair trial ere mercury is resorted to, for this mineral can always, at a pinch, be had recourse to. Every means and method that can maintain a high state of health should be diligently used. In the treatment of such sequelæ as characterize tertiary syphilis, the iodides of potassium, sodium, or ammonium are often useful, but more especially in cases where mercury has been taken, and this fact leads us strongly to suspect that many of the symptoms of tertiary syphilis are due to the mercury, which the iodides can, by forming with it soluble salts, expel from the system. It is common to meet men, well qualified to judge, who bitterly regret ever having taken a long course of mercury; but it is exceedingly rare to meet those who regret not having had recourse to it.

Tuberculosis (*Acute General Tuberculosis*, or "*Galloppiny Consumption*").

Caused by a micro-organism.

Characterized by two stages:

First stage—that of incubation—is of very uncertain duration, and marked by general and mild symptoms of derangement.

Second stage—that of invasion and advance—the onset of which is sudden, the duration three to six weeks, and the invariable termination, death. The symptoms are none of them characteristic, and the diagnosis is therefore often difficult. The fever present *is worse at night*, but rarely rises above 103° F. The patient is *dull* and *apathetic; emaciating* and *losing strength very rapidly.* The pulse is weak and *rapid, the skin dry and harsh*, and the tongue and *lips parched and cracked.* The bowels may be regular, or constipation or diarrhœa may be present. *Headache* is often much complained of, and towards the end *delirium* is usually present. There is, as a general rule, *no rash*, but sometimes a faint roseolous eruption on the abdomen will appear.

Remarks.—I have said but a few words on a very terrible disease, for, as I have already remarked, tuberculosis presents no distinctive marks by which we may assure ourselves of its presence. In fact, it usually is mistaken for typhoid fever, which its symptoms often very closely imitate.

That certain persons, especially the scrofulous, are exceedingly liable to be attacked by this disorder, is certain, and that the bacterium may develop in a slowly suppurating lymphatic gland, situated possibly out of sight and reach, and thus infect the blood, is also sure. An ordinary wound may also serve as its port of entry.

Whether a sound man may inhale the bacterium of tuberculosis, and thus become the subject of the malady, is questionable.

Erysipelas.

Caused by a micro-organism, which probably can only enter the blood directly through a broken surface.

Characterized by two stages:

First stage—that of incubation—lasting from a few hours up to seven days or longer, and marked by slight symptoms of malaise.

Second stage—that of advance—marked by *shivering*, *sore throat*, *fever*, and general constitutional disturbance of the ordinary febrile type, and by the appearance, first at the seat of inoculation, if there be one visible, and then rapidly spreading therefrom over the adjacent skin, of *a rash of a deep red color*, the *reddened skin being hot and dry*, and sometimes swelled and painful to the touch.

Concurrently with these symptoms, there may arise cerebral disturbance from the extension of the inflammation to the membranes of the brain, or *bronchitis*, or *vomiting*, or *diarrhœa*, from its extension to the lining membranes of the lungs, stomach, and intestine respectively. Its subsidence is followed by "peeling" of the skin attacked.

Resulting nearly always in death in the subjects of diabetes and of Bright's disease, who are also specially prone to be attacked; almost equally dangerous in lying-in women, in drunkards, and in those who have recently undergone severe operations; rarely fatal, except in its most severe forms, in others.

Remarks.—Like so many of the other results of blood-poisoning, erysipelas varies greatly in severity. While most authorities hold that it cannot enter the body but through broken skin, it is undeniable that a closely simi-

lar diffused redness of the skin, attended with mild constitutional disturbance, is witnessed often, especially in early infancy, though the cuticle be, to all appearances, whole.

No fever is so generally graded in its severity to the state of health of the person attacked as is erysipelas. In the heavy drinker, the diabetic, and the albuminuric, the smallest wound may become the seat of attack, which then spreads far and wide. Apparently the poison germ of this disorder may be bred in unhealthy discharges, for in crowded, close hospitals, especially in time of war, erysipelas will often make its appearance and lead to a disastrous mortality.

To give the reader some general idea of the varying nature of the attacks, all equally going under the one name—erysipelas—I append a short classification.

Non-contagious Erysipelas, or *Erythema.*—This, though bearing some likeness to mild erysipelas, is probably due to a different poison, one akin to that which produces epidemic roseola.

Ordinary superficial inflammation of the skin, the result of irritation, is also often improperly styled erysipelas. Both of these transient disorders, called by the French simply "*efflorescence cutanée*," are frequent in childhood. They are neither epidemic nor contagious.

Ordinary Erysipelas.—Often epidemic, and always transferable to those who have recent wounds. This is the type described as typical erysipelas, and which is sometimes fatal by extension to the brain, etc.

Phlegmonous Erysipelas.—This is a malignant form of the disorder, which commences in the upper layers of the skin, speedily extends to the tissues beneath, causing their rapid destruction, and leading often to a disintegration even of the muscular tissues, with exposure of the bones, and

thus to death by exhaustion. It is dangerous in proportion to its extent. The color of the skin, at first red, may pass to a *livid* and then to a *sickly white, tallowy* hue.

The treatment of erysipelas must be conducted on general principles. The isolation of the patient in a cool, well-ventilated room, and the dusting of the affected surface with finely powdered asbestos, flour, starch-powder, or white bismuth, together with the administration of a purgative, and care as to diet, which, in proportion as the malady is severe, should be fluid, light, and easily digestible, are all the measures that avail aught in the type of disease where the inflammatory process is confined to the superficial skin layers. In the phlegmonous form the patient must be placed under surgical treatment, for early and free incisions are often advisable to relieve the extreme tension of the inflammatory exudations and to save the deeper tissues from destruction.

Pyæmia (called also *Septicæmia*).

Under the term of pyæmia is probably included rather a group of similar diseases than a single malady.

Caused by a micro-organism.

Characterized by two stages:

First stage—that of incubation—the ordinary duration of which, judging from puerperal cases, is about forty-eight hours. This stage is marked by a rapid pulse, by slight fever, and general malaise.

Second stage—that of advance—marked by shivering, *nausea*, and often *severe vomiting*—the intensity of the vomiting being often a gauge of the malignancy of the poison—rapid pulse, a *sallow look*, *dilated pupils*, a rising temperature, *great prostration* of strength, much *perspiration*, a peculiarly *sweet odor of the breath*, the formation

frequently of *abscesses* in several of the internal organs. This stage may last for days or weeks.

Resulting, almost surely, in death.

Remarks.—While all cases of pyæmia present, as I have said, many marks of a family likeness, yet the fact that typical attacks of it may be undoubtedly caused by different poisons, leads to the conclusion that it is not itself a separate, single, and specific fever.

Thus the contagion of scarlet fever, of erysipelas, of diphtheria, of typhus, may all equally produce in those whose general health is depressed, and who are the subjects of recent wound or abrasion, pyæmic symptoms, and there is reason to think that, quite independently of any of them, a germ capable of producing pyæmia may develop in any unwholesome animal discharge under certain conditions of moisture and heat; thus the decomposing urine often passed by the aged or by those who are the subjects of bladder disease will produce, if introduced into a recent wound, this disorder.

Puerperal Fever (*i. e., child-bed or lying-in fever*) is simply pyæmia, and is a disease attended by a frightful mortality and very easy of transference. *Puerperal peritonitis*, an inflammatory state consequent sometimes on severe labor, and often also styled puerperal fever, is a very different and far less fatal disorder, and is not contagious.

Treatment.—This must be conducted on general principles. The most absolute cleanliness is essential. The general strength must, as far as possible, be maintained. No drug is of any service.

Tetanus.

Caused by a micro-organism.

Characterized by two stages:

First stage—that of incubation—which is rarely longer than three days, and which is marked by no noticeable symptoms.

Second stage—that of advance—sets in suddenly with shivering and *stiffness of the neck*, extending to the muscles of the jaw and tongue. The mouth, by the stiffening of the muscles of the jaw, becomes *firmly closed;* hence the popular term for this complaint is *lock-jaw*. From the face the stiffness gradually extends to the other muscles of the body, and is aggravated and rendered exceedingly painful by violent spasms which contract the muscles and contort the body. Breathing becomes difficult and deglutition impossible on account of the spasms excited by efforts to swallow. There is moderate fever, a rapid pulse, and great perspiration.

Remarks.—Tetanus closely simulates both hydrophobia and poisoning from strychnina. It may follow the least scratch, but is most common after extensive wounding with a dirty instrument. Exposure to cold and a depressed condition of the nervous system seem to predispose to it. Unlike pyæmia, it is, however, exceedingly rare after confinement, though at various times it has prevailed extensively among newly born infants, in whom it has been called "nine-day fits," from its advent in the second week of life. In these cases the poison enters probably by the divided umbilical cord, as does, not unfrequently, that of erysipelas.

Resulting rarely in recovery.

Treatment.—In mild cases, which are, however, rare and often doubtfully tetanic,* I have seen apparently excellent results from the administration under the skin of strychnina, $\frac{1}{12}$ of a grain being given every six or even

* Many so-called cases of tetanus are simply instances of hysterical spasm.

every four hours in the adult. I cannot, however, speak of its utility in severe cases, never having considered myself justified in making in such cases what even remotely might be considered an experiment. For such, a quick purge and the keeping of the patient in very *hot* but dry air are the first measures, and by Messrs. Allen's apparatus, which may be affixed to any bed, a temperature of 120° to 150° F. can be easily maintained in the air that surrounds the sufferer. Then conium, belladonna, chloral, hyoscyamine, nicotine, or Indian hemp, all more or less muscle-paralyzers, may be tried; but must, if given at all, be administered in full doses, and by the bowel or under the skin.

In severe cases, chloroform often has to be used for prolonged periods.

In hysterical cases, bromide of potassium in large doses succeeds in speedily producing an amelioration.

Hydrophobia.

Caused by a micro-organism capable of existing, and probably, under some conditions, of developing, in the blood of the dog, fox, wolf, cat, and other animals.*

Characterized by two stages:

First stage—that of incubation—which may exist without noticeable symptoms for weeks or months.

Second stage — that of invasion and advance — which commences by a feeling of pain in, or even by a breaking open again of, the scar, and is followed by a sense of *stiffness* in the throat and neck, some feverishness, and a very depressed and *excitable state* of the nervous system. This is succeeded by a period of great and almost *maniacal excitement*, during which spasms of the muscles of the body,

* Hydrophobia is really an eruptive fever, the rash of which appears in the medulla oblongata and spinal cord.

but especially those of the throat, face, and chest, are frequent and painful. *Swallowing is rendered impossible* by the frequency of the spasms. Constant efforts to clear the throat and frequent spitting are common symptoms.

Resulting in death in two or three days.

Treatment.—To be efficacious, the treatment must be carried out during the stage of incubation, but since but 5 per cent. of those bitten become eventually attacked, it is very difficult to gauge the results, if any, that are achieved by the different systems. Inoculation by Pasteur's method seems to confer an immunity from the disease on the dog, and probably would also do so in the case of man; but, as there are certain risks attendant on the process, no one so far has ventured to submit to it as a mere preventative. It is exceedingly questionable if, *after having been bitten* by an animal suffering from rabies, inoculation is of any real service. Experience has so far failed to confirm the hopes first excited by this means of treatment, and judging by the analogy of vaccination—which is powerless to prevent the advent of small-pox in one already in the stage of incubation—this system, like so many others, is probably doomed to fall into discredit.

I have no faith whatever in the ordinary application of nitrate of silver to the recent bite. If the wound be on a finger, a firm ligature must at once be applied close to its junction with the hand, and the wound must be vigorously sucked. If any other measures are taken, nothing short of a free excision of the wound, and the encouragement of the bleeding by keeping the wound in warm water containing a quantity of carbolic acid (two or three tablespoonfuls to the quart of hot water) should be attempted. If the dog be undoubtedly rabid, and the ligature applied has been tight enough to efficiently arrest circulation, it is best to amputate the finger, or at least by

leeches or incisions to endeavor to completely drain it of blood.

When once hydrophobia has become thoroughly developed, it is questionable if any drug is of service. The line of treatment is then similar to that in tetanus.

It is always well to remember that, even if hydrophobic symptoms supervene on the bite of a rabid animal, it does not follow, necessarily, that real hydrophobia is present, for fear may determine an attack of an hysterical, pseudo-hydrophobic nature, which may even be accompanied by some recrudescence in the wound. I have seen two cases of this kind, both of which made good recoveries.

To this short list of fevers which can only be communicated by inoculation through a broken skin surface, might be added no doubt many others, such as the "*malignant pustule*," from which butchers sometimes suffer; *post-mortem blood-poisoning*, from which more than one promising pathologist has died; *glanders or farcy*, a disease communicable by the horse to man; and many others.

Derangements of the Blood, probably non-bacterial in nature.

Leaving on one side diseases of the blood from inoculation of the venom of certain reptiles, a subject which, fortunately, in England is scarcely within the range of practical medicine, and also those due to the existence in the blood-stream of mineral and vegetable poisons, and to which we have already referred, we have left to us for discussion under the above heading but two complaints, both rare at the present day.

Purpura.

(*a*) *Purpura Simplex.*—This is not a very formidable, though it is a somewhat peculiar, disorder. It consists in

a morbid condition of the blood, sometimes the immediate consequence of rheumatic fever or of jaundice, at other times originating without apparent cause and quite suddenly. It is usually *not marked by any rise of temperature* (*i. e.*, is non-febrile), and often interferes but little with the sufferer's comfort.

It is characterized by the *sudden appearance on the skin of purple spots*, varying in size from a pin's-head to a large patch. The spots do not disappear on pressure.

These spots are produced by hemorrhages under the skin, and are akin to the so-called petechiæ, which are seen in typhus and sometimes in small-pox, and are always due, in whatever disease they may occur, to a feebly coagulable state of the blood, the result of some morbid process.

(*b*) *Purpura Hæmorrhagica.*—This is a much more severe form of purpura, for, in addition to the local purple skin spots, free *bleeding takes place* from the mucous membranes of *the mouth, nostrils, bowel, and urinary track*, sometimes *into the pericardium and pleuræ*, and not unfrequently *into the brain.*

Like simple purpura, it may arise spontaneously, or may accompany or follow some other disease, especially acute and sub-acute rheumatism, typhoid and typhus fever, and severe affections of the liver.

Scurvy (Scorbutus).

A chronic, non-febrile disease, consisting, like purpura, in a badly coagulable condition of the blood, and marked therefore, like it, by extravasations of blood under the skin and sometimes into the deeper structures of the body.

The main symptoms are—the appearance on the body of *purple spots or patches*, the skin over which sometimes

breaks down, particularly on the legs, producing large, *black ulcerations*. *Great debility* and *pallor of the skin*, *pains in the back and limbs*, *breathlessness* on exertion, *palpitation*, great *sponginess and swelling of gums*, which bleed on pressure, and *fœtor of the breath* are other common accompaniments.

Caused by defects in diet, especially by want of fresh vegetables.

Remarks on Purpura and Scurvy.—There is a strong general likeness in the symptoms of both. The latter is, however, marked by much greater prostration, and is easily curable by means of good diet, with plenty of fruit and vegetables. Lime-juice is a well-known preventative and cure. Scurvy is rare among sailors at the present day, but may sometimes be seen, in a mild form, among poor and badly fed seamstresses. Purpura, though by preference it selects the poor, is not confined to the under-fed; it is not improved by lime-juice, nor even markedly improved by a good diet. It disappears, in all cases that recover, of its own accord, being unaffected by any known treatment, rest (the most absolute rest is essential in bad cases) and quiet being the only agents that assist recovery.

It is exceedingly probable that both purpura and scurvy are, like the diseases which we are now about to study, mere secondary consequences of disorder in the blood-glands.

III. DISORDERS OF THE BLOOD-FORMING GLANDS.

Leucocythæmia.

A chronic disease of the spleen or of the lymphatic glands, or of both.

Characterized by enlargement of the spleen or lymphatic glands of the body, or of both, unaccompanied by any pain or fever; by *a great increase in the white-blood cor-*

puscles and a corresponding diminution in the red, and hence by *extreme pallor and debility, with a tendency to dropsy*, and to *hemorrhages* that are difficult of arrest.

Caused sometimes by repeated attacks of ague, sometimes by syphilis, but often originating spontaneously.

Remarks.—In addition to the enlargement of the spleen and of the lymphatic glands, there is concomitantly a tendency to increase in size of the lymphatic tissue of the body generally. Leucocythæmia is a rare disease, and is in nearly every case slowly fatal.

Treatment.—When the disease commences in, and is confined solely to, the spleen, the only rational treatment is to remove that organ. No drug is of the least service. The maintenance of the general health by means of change of air, good food, etc., is the object to be aimed at.

Adenia (or Hodgkin's Disease).

A chronic disease of the spleen and the lymphatic glands, resulting in their enlargement and in the secondary derangements which flow from an impoverished blood supply.

Adenia is identical in every respect with leucocythæmia *except* in this particular, that in Adenia there is, with the diminution of the number of red-blood corpuscles, *no increase in the number of white ones.*

Addison's Disease.

A chronic disease marked by enlargement and often by degeneration of the supra-renal capsules (small bodies supposed to play the part of blood-glands and situated upon the kidneys).

Characterized by a brown discoloration of the skin, particularly in the regions of the *groin*, *armpits*, *hands*, and *face*, and sometimes also of the *lips*, *gums*, and

tongue; by great poverty of the blood (*anæmia*), and by *debility.*

Caused by unknown conditions.

Resulting, sooner or later, in death from exhaustion or secondary derangements.

Treatment consists in attempts directed to the maintenance or improvement of the general health.

Progressive Pernicious Anæmia.

A chronic and rare disease, due probably (since the spleen is often found enlarged and softened) to some obscure failure of the blood-forming organs.

Characterized by all the symptoms of greatly impoverished blood—*e. g.*, *pallor*, *breathlessness*, *debility*, *vertigo*, *headache*, *palpitation*, *sleeplessness*, *vomiting*, and *copious hemorrhages* into the skin or internal organs. Often marked also by fever.

Caused by unknown conditions.

Resulting almost invariably in death.

Treatment to be directed to the maintenance of as high a state of health as possible.

Remarks.—The causation of this extraordinary disease is still a matter of dispute; one author (*e. g.*, Dr. William Hunter) attributes it to the entrance of some poison into the blood-current, and this view is not an improbable one.

Simple Anæmia.

A poverty of blood consisting in diminution in *all* the constituents of the blood. Though often spoken of as a separate disease, it is merely a symptom which may be attendant on any one of the following disorders:

a. { Deficient food.
Inability to swallow or digest food.
" absorb food.

b. Derangement of blood-forming glands.
" circulation.
" lungs (*i. e.*, of aëration of the blood).

c. Loss of blood:
(*a*) from bowel, as in piles.
(*b*) from womb, etc., as in profuse hemorrhages accompanying female derangements.
(*c*) from kidney (as in Bright's disease).

d. Profuse discharges from sores.
Cancerous and other internal diseases.

The treatment consists:

(*a*) In the removal of the cause.

(*b*) In the maintenance and improvement of the general health. In those under forty years of age an increase in the number of red-blood corpuscles may be accelerated by the administration of ferruginous tonics (Formulæ Nos. 16, 17, 18).

Sufferers from anæmia are more often plump than thin, the deficiency of red-blood corpuscles leading to the deposit, as fat, of much of the fuel-food consumed.

Chlorosis.

A condition of anæmia common in young unmarried females between thirteen and twenty-five years of age, and marked by certain special characters.

The condition of the blood in chlorosis differs from that in other forms of anæmia, inasmuch as, with small, badly formed, and deficient red-blood corpuscles, the *other constituents of the blood are normal in amount and kind.*

To the ordinary symptoms of anæmia—*i. e.*, *pallor*, *breathlessness*, *dyspepsia*, *debility*, etc.—there are gener-

ally superadded marked *constipation*, *hysterical symptoms*, and white discharges, while the periods are either entirely absent or are scanty and pale. The sufferers are usually *plump*.

Caused by unknown conditions, but certainly connected with functional torpor of the organs of reproduction, hence the old term for this disease, Pallor Virginum.

The advent of the disease is favored by bad hygienic conditions.

Resulting nearly always in recovery.

Remarks.—Though often a cause of great alarm to anxious mothers, chlorosis is singularly amenable to cure by all the means which tend to improvement of the general health.

Treatment consists in improving the health by fresh air, rest, and good food. Medicines that contain iron often do good (Appendix, Formulæ Nos. 16, 17, 18). Marriage cures the disorder.

Exophthalmic Goitre (Graves's Disease).

A disease rare in males, and most common in unmarried females between the ages of thirteen and twenty-five years.

Marked by all the symptoms of *anæmia*, *plus* an enlargement of the thyroid gland in the throat, (*i. e.*, *goitre*), a *protrusion of the eyeballs*, *constant palpitation*, and great *nervous excitability*.

Caused probably by derangement of some portion of the sympathetic nervous system situate in the neck; sometimes of a functional nature and dependent on temporary disorder of the reproductive system, and then curable; sometimes of an organic nature and incurable.

Resulting sometimes in death, sometimes in recovery.

Treatment.—The *cautious* application of the constant electric current over the affected part of the sympathetic

nervous system often does good in cases where functional derangement alone is present. Efforts to improve the general health must be made.

Remarks.—In exophthalmic goitre the prognosis depends entirely upon the age and general surroundings. If the patient be female, young, unmarried, and chlorotic, the outlook is generally favorable; in all other cases it is grave.

The strong family likeness between the different diseases of the blood-glands, almost approaching to identity in leucocythæmia and adenia, and again in anæmia and chlorosis, admit, though the exact pathology of none of them is accurately determined, of one or two useful generalizations.

We have on the one hand chlorosis, simple anæmia (here spoken of, in the popular way, as a disease), and the form of exophthalmic goitre seen in young, badly fed, and pale girls, all often due to a mere functional derangement of the blood-forming glands, since they often get well, leaving no trace of weakness behind them. These disorders are furthermore often consequent on weakening causes, often of a transient nature, for the period of life at which chlorosis and exophthalmic goitre appear is one in which great demands upon the body are made by the evolution of the reproductive organs, and the reproductive system holds in females a much more prominent place, in relation to the whole body, than it does in men. Sufferers, moreover, from the diseases named are not as a rule only passing thus through a critical period, but they are nearly always found to be overworked, underfed, and living in bad hygienic surroundings. It is, therefore, not difficult to believe that in a temporary failure of blood-making organs alone may often lie the causes of all these maladies. Anæmia, again, of the simple order, never oc-

curs but as the consequence of some drain on the system, and disappears when this is arrested.

On the other hand we have in leucocythæmia, adenia, and Addison's disease, instances of an inflammatory growth, more or less extended and affecting the blood-glands, and sooner or later necessarily followed by their degeneration and failure; often behind this again being scrofula, syphilis, malarial fever, or some strong hereditary predisposition.

CHAPTER XIII.

DISEASES DUE TO DEFECTS IN THE ORGANS OF THE FOOD SYSTEM.

DISORDERS OF THE LYMPHATICS.

Arrangement and Functions of the Lymphatic Organs.

Functional Disorders of the Lymphatics.	Acute and Chronic Rheumatism, Syphilis, and, to some extent, Gout.
Degenerations of the Lymphatics.	Scrofula, Inherited Syphilis, the sequelæ of Syphilis, Leucocythæmia, Adenia, Addison's Disease.

CHAPTER XIII.

DISEASES DUE TO DEFECTS IN THE ORGANS OF THE FOOD SYSTEM.

IV. DISORDERS OF THE LYMPHATICS.

The lymphatic system—for so the lymphatics are called collectively — comprises a series of intercellular spaces, ducts, glands, and pumps.

The intercellular spaces are the irregular cavities which surround the cells of the body, and into which the serum of the blood, as it exudes from the capillaries to supply the cells, is poured. But the cells cast out certain waste—by-products of the chemical interchange which they are constantly undergoing—which also falls into the intercellular spaces. It is evident therefore that, to prevent surcharge and clogging of these spaces, they must from time to time be relieved both of this waste and of any excess of serum albumen which they may contain. This is effected by means of the movement of the organ, usually a muscle, in which the spaces are situate, and which acts the part of a pump, compressing these spaces from time to time, and forcing their contents onward into the lymphatic ducts which take their origin in the intercellular spaces. Once in the ducts, backward flow is prevented by

means of valves, and the onward current is promoted by the same means as those which effected the emptying of the intercellular spaces.

The lymphatic ducts pass through lymphatic glands, where the lymph undergoes slight changes, and where any poisons in it are arrested, onward towards its final destiny, the internal jugular vein at the root of the neck. But before the lymph reaches that point it is poured into certain intervening cavities which play the part of *pumps*. These are the *synovial membranes* of joints which, thanks to the movements of the limbs, are enabled to play this *rôle;* the *pleuræ* which surround the lungs, converted to pumps by the movements of the lungs; the *pericardium* which envelopes the heart, and which utilizes in a similar direction the force transmitted to it by the cardiac movements; the *peritoneum* working as a pump, thanks to both the respiratory and the intestinal movements.

Such are the great cavities—for they are really closed sacs—into which the lymph is poured, and such the source of their power as *lymph pumps*.

To these, though not closed cavities, must be added the *serous surfaces* of the body, especially the *serous membranes which line the heart and its valves, the arteries and the veins*, which, themselves a direct continuation of the lymphatic ducts, aid, probably by the force derived from the movements of the organs which they line, in the lymph circulation.

Emptied thus into the large closed sacs I have mentioned—which with their contained lymph form a species of protective water-cushion for the important organs that they envelope, while at the same time acting as pumps—the lymph remains therein for a time, to be eventually pumped along larger lymph channels into the base of the internal jugular vein at the root of the neck. Once again

in the blood circulation, the surplus serum in the lymph is once more sent round by way of the heart to feed the cells, while the cell débris is transported to the kidneys and skin for ejection from the body.

We have already more than once in the earlier parts of this work remarked that in the human body—the result, so the evolutionists say, of the continual struggle for existence and the constant natural increase of perfection in the survivors from the struggle—an economy of function is practised wherever this is possible. Indeed, in the great lymph sacs we have had an instance of organs playing a dual part, so is it in the lymphatic system of ducts and glands which has, so to speak, tacked on to it a pseudo-lymphatic department situate in the abdomen and concerned in the absorption of emulsionized fat in the intestine. The open ends of the ducts appertaining to this division take up the particles of fat, transmit them through the lymphatic (called also lacteal) glands of the abdomen, and empty them eventually, mingled with the cell débris and the surplus serum, of which I have already spoken, into the internal jugular vein.

The lymphatic ducts, therefore, in their ultimate and largest channels (those that lead direct into the vein) contain cell débris, serum, and emulsionized fat, the latter destined, as we know, for a fuel-food.

The lymphatic glands have one further function, for they are, in what manner we know not, manufacturers of white-blood corpuscles.

Keeping in mind, then, the anatomy and functions of the lymphatic system, we shall be easily able to comprehend the otherwise very puzzling and inexplicable sequence of events in the diseases that affect this system.

These are of two kinds : the *functional*, due to a temporary breakdown of the lymphatic system, or of some

portion of it; and the *degenerative*, due to some organic change leading to permanent incapacity.

(*a*) **The chief functional disorders** of the lymphatic system are **Acute Rheumatism** (rheumatic fever), **Chronic Rheumatism**, and the fever **Syphilis.**

Rheumatic Fever, *or Acute Rheumatism.*—We have already traced in disorders of nutrition, combined often with failure, from overwork, of the nervous system and check of the functions of the skin, the genesis in the tissues of the poison, uric acid, which produces this febrile disease.*

Now just imagine, in place of surplus serum and cell débris contained in the intercellular spaces, the surplus serum in contact with an abundance of uric acid (and other chemical compounds allied thereto), and this occurring either in a broken-down man or in one who feeds to excess and does not, by neglecting exercise, bring his lymph pumps into proper play, and we shall get, as a natural result, pain and stiffness in one or more muscles, and, if the poison travel, as it often does, in one or more joints; in short, we shall have **Rheumatism of the chronic form,** so often to be observed in the aged, and which is incurable, because the body is rapidly going down hill. The sufferer, by clothing in flannel, and thereby keeping his skin in functional activity, by careful dieting and by the aid of frictions, and perhaps by the judicious use of stimulants, will manage, with more or less success, to keep his enemy back; but an excess of moisture in the air, a rapid fall in the thermometer, a slight want of accustomed exercise, a little extra worry, and the painful disorder will quickly

* Some maintain that a special micro-organism is the cause of rheumatic fever; but even if this be so, and there is no proof thereof, the poison, uric acid, to which it gives rise is still the *materies morbi* of the disorder.

reappear, though it will probably not get beyond one or two joints.

In a younger man the course is different. His body is vigorous and tolerant, and in the disease we are now considering, as in gout and biliousness, the poison will go on accumulating, producing merely an occasional twinge and a little malaise, till, *all at once*, a revolution in the long-suffering body breaks out as a result of some extensive arrest of the functions of the skin, as by sleeping in damp sheets, etc. The damp sheets are not the cause of the disease; they represent the last straw that brings the camel to the ground. The breach between the poison and the body must have come in any case unless the course in life had been radically altered; the damp sheets have only precipitated the crisis. And now, by a vigorous course of action, the body proceeds to clear off the poison, to square the accounts.

The poison advances to the glands and joints, and these inflame; then on to pleuræ, producing pleurisy; to the pericardium, producing pericarditis; to the serous lining of the heart and blood-vessels, producing heart disease and often arterial mischief.*

Such, as all medical men and many laymen know, is the course of **Rheumatic Fever** or **Acute Rheumatism.**

The peritoneum and the under surface of the diaphragm are not generally attacked, for they belong to that almost distinct department of the lymphatic system concerned in the absorption of the fats, and therefore have not much, either in function or in disorder, in common with the rest of this system.

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* I have purposely omitted mention in this connection of the serous membranes of the brain, as they differ somewhat in structure and function from the others, and are but comparatively seldom the seat of attack in rheumatic fever.

What are the terminations and what is the treatment respectively of the chronic and acute varieties of rheumatism described?

The end of chronic rheumatism is, if the patient be aged or incurably feeble, chronic valetudinarianism, but the sufferings may be relieved by exercise, and the man who suffers from rheumatism well knows how the stiff and painful joints in the morning become easy and supple after a little use. This exercise may be of the ordinary normal kind, or may be, by means of frictions and rubbings, artificially performed. Any measures that improve the general health, as well as all those which maintain or increase the skin functions, have also a good effect; a nourishing but simple diet, change of scene and of occupation can effect the former indication, the wearing of rough flannels, hot baths of plain water, brine, mud, or sea-weed, the latter purpose.

Among drugs, iodide of potassium, a potent and special lymphatic stimulant, will often temporarily effect wonders, but it should be always combined with Peruvian bark or ammonia to check in some sort its evil effects on the body at large. Guiaiacum, guarana, sulphur, phosphorus, quinine, and a host of other drugs, as well as the employment of some forms of electricity, are often of temporary avail, but they are all local stimulants, and the accommodation they afford has, subsequently, to be paid for.

The termination of rheumatic fever or acute rheumatism is, if some important organ attacked does not succumb to the violence, in health, for the feverish process is a purely curative measure, oxidizing the uric acid to urea and cutting off, by the removal of appetite, the supplies of fresh poison. Often, however, as we know, are irremovable traces of the ravages wrought left behind in the valves

or openings of the heart — which in consequence become unequal to their work—or in the pericardium or pleuræ.

The treatment of rheumatic fever consists—

(*a*) In rest in bed, in a well-warmed room, the patient lying between the blankets to keep the skin in equable action.

(*b*) In a very restricted dietary.

(*c*) In the administration of certain drugs.

As for medicines, the medical world has always been divided in its opinion as to the proper course. Speaking generally, there are four plans :

(1) Endeavor to keep the kidneys in action by alkaline salts, acetate of potash, etc. Keep the bowels regular by aperients. Keep the skin in action.

(2) Apply blisters over or near the swollen joints.

(3) Administer iodide of potassium in large and repeated doses.

(4) Give salicylic acid and its salts.

It is impossible in the limits of this work to discuss the relative merits of each system. The relief given by full doses of the salicylates is rapid and great, but the drawbacks attendant on this system of treatment are serious, and the real utility of this plan is open to grave doubt. On the whole, it may be said that the less of active medication be undertaken in rheumatic fever the better for the patient. It is always astonishing to those who had never witnessed it — and there are many who are quite unacquainted with the normal history of unmeddled-with disease—to see how splendidly successful a do-nothing system of treatment, as far as drugs go, usually is.

My own practice is to give small doses of the citrate of potassium, or of the acetate of potassium, in plenty of water, every four or six hours, and a quarter to half a grain of morphia under the skin at bedtime each evening

during the stress of the attack, and but rarely, and only in exceptional circumstances, the salicylates, salol, or salicin.

Gout may expend some of its fury on the lymphatic system, and is therefore one, but as compared with acute rheumatism an uncommon, cause of heart and arterial disease, or even of chronic disorder of the pericardium or pleuræ.

The poison of rheumatism — uric acid — is the same as that of gout, but its place of production is the liver, not the lymphatic system.

Syphilis is, as we know, a fever, but one in which the brunt of the attack falls from the first on the lymphatic system. One of its earliest symptoms is therefore an enlargement, all over the body, of the lymphatic glands. It pervades, with the lymphatic ducts, every part of the body, and its consequences and ravages may take place in any organ. It is hardly too much to say that it can alone produce almost every variety of disease, except the fevers This is what we should expect from such a general disorder of the ubiquitous lymph channels.

The treatment has already been discussed.

(*b*) **Degenerative changes of the lymphatic system,** which give rise to what are called organic, as distinguished from functional, disorders, are at the root of some of the most troublesome — and necessarily most general — of diseases.

Their results may be thus enumerated :

(1) Scrofula and tuberculosis.

(2) Inherited syphilis.

The above are examples of congenital degenerations, so to speak ; the infant affected by them starting life with a fatally weak lymphatic system.

(3) The sequelæ of syphilis, aggravated by mercurial poisoning.

(4) Leucocythæmia.
(5) Adenia.
(6) Addison's disease (?).

All of which commence during the life of the sufferer as inflammatory processes, and end, as all chronic inflammation must, in degenerative changes.

There are many pathologists who hold, and with very strong reason, that syphilis alone is at the bottom of all the degenerative failures of the lymphatic system. Many times, no doubt, the syphilitic taint is untraceable, having originated several generations before the sufferer from scrofula was born, and has only been brought into the witness-box of life by intermarriage with a family similarly heirloomed, or by the too-early ages of the parents, or the too-advanced age of the father, or by a fall in fortune of the family; the strain of the body induced by want, worry, and the hard struggle for existence, or other debilitating cause, bringing out, perhaps late in life, the weak point that might otherwise have remained latent and unsuspected. There are many stages of degeneration in every system of the body, each with its special train of symptoms, some of which cannot be developed in a single generation. We have a familiar example of this truth in gout. The savage cannot be made gouty, though he eat and drink everything provocative of the disorder; it takes more than one generation of gluttony to evolve the full-blown disease which passes by the name of gout, while it is only in recent times that a great variety of symptoms, formerly classified as distinct disorders, have been proved to be but varying manifestations of the same disorder.

Just as chemistry has gradually reduced the list of simple elements, and is still further reducing their number, showing that what formerly were classified as such are, after all, but compounds of other elements, so in medicine

a simplification, which will yet make great advances, marks our steadily accumulating stock of knowledge; and the time is probably not far distant when, to failures and mistakes in nutrition on the one hand, and to poisons, such as that of syphilis and of the other fevers, or that of mineral or vegetable origin, on the other, will be conclusively traced every derangement, functional and organic, of the human body.

In that day the practice of medicine will have become really scientific, and will be able to command the confidence and gratitude of all humanity.

In the meantime, however, we must discuss degenerative disorders of the lymphatic system as separate and distinct entities.

Scrofula (or Struma).—The underlying cause of all the manifestations of scrofula lies in an inherited debility of the whole lymphatic system.

This reacts, of course, upon the general bodily health, and thus, independently of the very characteristic phenomena dependent on this lymphatic failure, and which we shall presently allude to, there is, from the time of birth, a generally unsatisfactory state of health, which, in all bad cases, stamps the individual with certain marked features which make a diagnosis very quick and easy. The following are some of the common characteristics of the scrofulous type of individual, as seen in children:

The color of the hair is, in the majority of cases, dark; the abdomen *large and tumid;* the *tonsils swelled;* the *glands of the neck* distinctly to be felt as *hard lumps* under the skin; the scalp and other parts of the body surface exhibit a *tendency to eruptions;* the eyes are often *weak*, and small ulcers on their surfaces are not uncommon; discharges from the nose, eyes, and ears are common and difficult to cure; the stomach and bowels are often de-

ranged and the appetite *capricious*, in some cases excessive; the intellect is dull and the habits often uncleanly; the circulation is sluggish. The *upper* lip is often thick and short, and the head large. Sometimes, as a result of excess of water on the brain, the forehead projects. The fingers are often clubbed. The sufferer may *appear plump*, but this is not the result of muscular development and healthy fat, but rather of a serous infiltration of the tissues. In these children the fevers, especially measles and scarlet fever, tend to assume a serious aspect, the throat and glands of the neck becoming badly affected, and obstinate discharges of matter from the ear tending to be set up. This class of child is always improved by fats, though such food is instinctively shunned, being of course badly assimilated, and therefore an easily digested fat, such as cod-liver oil, will often do great good. Sea air, both by whipping up the circulation and relaxed system, and by the iodine which it contains, always effects an improvement.

There is, however, sometimes, but rarely, to be seen a scrofulous type of very different mould. In children of this class the *face is oval*, the *eyes bright*, the *pupils large*, the *features regular*. The *body is thin*, the *limbs straight* and shapely, the *head rather small*, and the *intellect clear* and markedly precocious. This angel-type of child is the delight of its teachers, being sharp and quick and good. Of such children the nurses of old were wont to say that they were "too good to live."

Having, then, in deference to the special importance of this disease, gone out of our way to make a picture of individual sufferers which can, however, never convey any real instruction unless the dependence of each symptom and special trait on the underlying cause be also understood, let us return to a close study of scrofula in its evolution from a mere debility of the lymphatic system at

birth, to a vast and varied series of phenomena in youth and middle age.

Now, the lymphatic system is concerned in the absorption of fats, and, in common with the kidneys, skin, and lungs, in the removal of waste.

One of the earliest symptoms of scrofula is a *repugnance*—instinctive in character—*for fats*, with which falls also to be noted the instructive fact that, in whatever form of bodily derangement scrofula may appear, the administration of fats easy of assimilation will always effect an improvement therein or even a temporary cure.

Again, if one set of the excretory organs, such as the lymphatic ducts and glands, fail, the extra work thrown upon the others, that are similar in function, will lead to their frequent derangement: this is only what we should expect, and, as a matter of common experience, *nearly every form of skin disease* and *nearly every variety of kidney disease* (except gouty kidney), *most of the grave disorders of the lung*, and many of the milder ones, have in scrofula their undoubted origin.

In the lymphatic system itself the disorder is, of course, evidenced. The *tonsils*, which are mainly in their structure and function lymphatic glands, become *enlarged*, while the *glands of the neck* may readily be *felt by the fingers*, and sometimes undergo an exceedingly slow variety of inflammation, unattended by marked pain or local heat, and spoken of in popular language as "*cold abscesses*." These swellings sometimes break, leaving unseemly scars on the neck, always rightly regarded as strong evidence of scrofulous taint. This glandular swelling is, however, not confined to the region of the neck, but is general all over the body, the glands in the abdomen being sometimes evident to touch as deep-seated hard masses of the size and shape of filberts. Many of the obscure derangements of scrofu-

lous children are due to swelling of the deeper glands, and many a chronic cough is kept up by presence of such enlarged glands in some part of the lungs.

Bone disease commencing in the fibrous sheath which coats both the external surfaces and the inner cavities of bones, and which is rich in lymphatics, is one of the commonest of scrofulous ailments.

Diseases of the lymph pumps are, of course, frequent sequences of scrofula, the synovial and serous membranes of joints are often attacked, the disease advancing till the bone itself becomes affected and the use of the joint irreparably lost; the peritoneum, the pleuræ, the pericardium, the lining serous membranes of the heart, arteries, and of the brain itself being also often the seats of scrofulous disorder.

But *the* disease *par excellence* of scrofula is **consumption.**

It would be difficult to find a stronger example of the evil system in vogue for the classification of maladies than in the use of the one term *consumption* or *phthisis* to cover at least three widely different states of the body, each demanding different treatment. I will dwell briefly upon the scrofulous varieties and will merely mention the others, deferring a discussion of them till the subject of lung derangements shall arise.

Tubercular Consumption.—This, the commonest of all the varieties of this malady, is purely of scrofulous origin. Its genesis from scrofula is as follows. An inflamed scrofulous gland slowly breaks down in any part of the body, and the peculiar whey-like matter, in place of being evacuated through the skin, is slowly absorbed by the lymphatics leading from the gland, and thus sets up mischief, sometimes in all, sometimes only in some, of the lymphatic glands and ducts.

If the whole lymphatic system is thus poisoned we get

the frightful disease, *general tuberculosis*, which runs a course of from one to six weeks and *always* terminates fatally. This is the "*galloping consumption*" known to the public, and which we have already discussed. More often, however, the poisoning of the lymphatic system, though extensive, is *most marked* in one region only of the body. In children this region is the abdomen, and we thus get "abdominal tubercular phthisis," or "**Consumption of the Bowels**" as it is popularly called. This is marked by painless *swelling of the abdomen*, irregular action of the bowels, *extreme wasting and debility*. The appetite may be *absent* or *voracious*.

As the disease advances, the enlarged lymphatic glands in the abdomen may easily be *felt* by the hand. Sometimes from the first, always towards the end of the malady, the tubercular poison spreads to the lungs, brain, and body at large, causing everywhere an enlargement of the glands. Recovery is possible if the disease be at first local and early recognized. It is always fatal when advanced. Its treatment is, of course, that of scrofula generally—the administration of foods, especially of easily digested fats, sea or good country air, and the adoption of every means to improve the general health.

In the adult the lungs are generally the seat of the attack, and here again the disease may be at first local and perhaps curable, subsequently extending to the whole body, or may from the very first be general in character, but most prominently mischievous in the lungs. In these organs, as in the abdomen (and body generally), both the lymphatic glands become enlarged, and the small, at first pearly-white and then yellowish masses, filled with lymphoid cells, called tubercles, stud the course of the lymphatic ducts. As the disease advances the latter break down and form small cavities, which amalgamate, the giv-

ing way of small blood-vessels as a result of this process leading to the "*spitting of blood*," which often is the first indication of lung mischief.

The outlook in this malady depends upon the stage of the disorder. It is hopeful in the early stages if the disease is local, and prompt means can be taken to improve the health and to supply the body with fats; it is hopeless in the advanced stages and when once the body at large is affected.

Inflammatory Consumption.—In the production of this form of phthisis, scrofula plays not the primary, but only a secondary part.

(*a*) *Inflammation of the small lobules of the lung, called "catarrhal or lobular pneumonia,"* commences usually as a bronchitis (catarrhal bronchitis) in the smaller bronchial tubes of delicate or aged people, or of scrofulous children whose health has been pulled down by some disorder, *such as measles, whooping-cough*, etc., and is marked by the ordinary symptoms of bronchitis—*cough, feverishness*, etc. The process then extends from the bronchial tubes to the surrounding tissues, and the lung substance itself, here and there, becomes inflamed. One of two things, decided by the strength of the sufferer, may now occur: either slowly the inflammatory process may pass away, or the inflamed patch may break down into a cavity which may go on enlarging. In some cases the lymphatics may take up the softened inflammatory matter, and general tuberculosis may thus all at once arise.

(*b*) *Inflammation of the large lobes of the lung, or ordinary Pneumonia.*—This, the common form of "*inflammation of the lungs*," usually results in recovery, but sometimes the softening process of the inflammatory products, which goes on towards the end of the attack, may end in the formation of lung cavities and phthisis.

It is abundantly clear to the reader that inflammatory phthisis, a very frequent variety of the disease, is quite a different disorder in causation and in prognosis to the tubercular form. As a matter of fact, the majority of the cases of inflammatory phthisis, if placed under favorable conditions for health, get quite well.

Mechanical Consumption is caused by a breaking down of portions of the lung from the irritation which results from the inhaling of air laden with certain materials, such as coal-dust, particles of steel, etc. "Grinders' rot" and "coal-miners' consumption" (anthracosis) are examples of this variety, which has nothing to do with scrofula.

Fibroid Consumption is a form of phthisis, also quite alien to scrofula, the result of the increase of fibroid tissue in the lung, followed by contraction.

Thus, of the five forms of consumption, the chief one is a disease of purely scrofulous origin; the variety next in importance is often determined though not caused by scrofula; while the third, fourth, and fifth have no relation to scrofula.

Inherited Syphilis.—I have already stated that the similarity between constitutional syphilis and scrofula, both general derangements of the *whole* lymphatic system, is very great, so great indeed as to lead many pathologists to regard them as identical in origin, and congenital syphilis as the immediate descendant of the acquired form, scrofula a more distant relation.

There are certain phenomena in infancy and childhood on which a strong presumption of syphilis, though no absolutely sure diagnosis, can be based, since scrofulous and delicate children generally may exhibit occasionally similar characteristics. They are as follows: The skin at birth is usually of a *dull color* and the features are *contracted* like those of an old man. Rashes appear, especially on

the *palms* and *soles*, but often also all over the body. The child fails to get on, and usually begins, spite of all care, to *waste*. The moist parts of the body—*i. e.*, those at the angle of the mouth, at the nostrils, between the buttocks and thighs, and at the folds of the joints—become copper-colored and inflamed. *Snuffling* in the nose is distinct. Such are among the commoner phenomena, as seen in the first six months of life, which may lead to the suspicion of congenital syphilis.

As life advances the *eyes* tend to become *affected*, sometimes with superficial ulcerations, sometimes with inflammations of the iris and cornea. The *permanent teeth are often peg-shaped* and very irregularly set, the upper incisors, and sometimes also the lower, being *turreted*. *Deafness*, the result of disease of the internal ear, is not uncommon. A tendency to *skin disease* remains throughout life.

Consumption of the tubercular type is common at all ages in the subjects of congenital syphilis.

As life advances the sufferer loses all special indications of his congenital taint, except, of course, the irregularities of the teeth, and becomes to all intents simply scrofulous.

Once more I must caution my readers against placing too much reliance on any of the so-called special characteristics of congenital syphilis. Any cause adverse to health in a pregnant woman will result in the birth of a child bearing all, or nearly all, such pseudo-diagnostic traits, although no taint of acquired syphilis may exist in either parent, such adverse maternal cause having simply brought into prominence in the infant some faint scrofulous family tendency which, under more favorable conditions of development, has appeared in no other of her children.

The treatment of congenital syphilis is by mercury. The medical man has practically no choice; he selects in the

after-consequences of mercury a lesser evil than almost certain death. The drug, usually administered in the form of gray powder (two grains of which, with an equal quantity of white sugar, being placed twice a day on the tongue), has a marked effect, stimulating and rousing the feeble lymphatic system, and admitting thus of the absorption of the fats in milk-food, of the expulsion of the morbid materials in the lymphatic and blood streams which have caused the skin to inflame, thus advancing considerably the chances of life.

The mercury should be gradually discontinued as the symptoms improve. Then general measures to maintain the bodily health must be had recourse to.

The reader will, no doubt, confounding me, perchance, with the blind fanatics who shut their eyes to all that does not square with their fixed preconceptions, wonder at my recommendation of mercury in this connection. Let such remember, however, that no material is either good or bad in the abstract, everything being relatively, and according to the conditions present, either good or bad. It is so with mercury, an absolutely bad drug in the vast majority of cases of acquired syphilis, in which there is neither danger to life nor to any important organ, and in which, therefore, the physician is quite unjustified in mortgaging the patient's future life to pay off debts that are not pressing, himself—the physician—figuring all the time as a philanthropist who has found the money himself for the purpose, and not as a man who has raised a loan at the expense of the patient's property and practically without his knowledge or sanction; but in congenital syphilis, and in very severe acquired forms, the case is altered: the patient is at death's door, life must be retained at any sacrifice, and mercury figures no longer, therefore, in the list of evils.

As for the other degenerations affecting the lymphatic organs, the "*sequelæ of syphilis*" is a term by which is meant that disorganization of the lymphatic system due to syphilis and which persists and leads to a great many evils, after the actual fever of syphilis has passed. This we have in earlier pages discussed as "tertiary syphilis." *Leucocythæmia*, *adenia*, and *Addison's disease* are disorders of the blood-forming glands, but, as the chief glands of that order are lymphatic glands as well, may also be reckoned as organic degenerative diseases of the lymphatic system. They have been already described.

CHAPTER XIV.

DISEASES DUE TO DEFECTS IN THE ORGANS OF THE FOOD SYSTEM.

DISORDERS OF THE SKIN AND KIDNEYS.

FUNCTIONS OF THE SKIN.

No. 1. *Skin Diseases due to Blood Poisons.*

(*a*) *To Micro-organisms.*—The fever eruptions.

(*b*) *To Gout.*—Eczema, Acne (red and simple varieties), etc.

(*c*) *To Syphilis.*—Roseolous Eruption; some varieties of Eczema, of Ecthyma, of Lichen, of Pityriasis and of Psoriasis; Rupia, etc.

(*d*) *To other, various, impurities:*

Affecting the Sweat-glands. — Hyperidrosis, Dysidrosis, Sudamina.

Affecting the Sebaceous Glands of the Skin.—Seborrhœa, Comedones, Acne (of some forms), Molluscum, Boils, Xanthelasma.

Affecting the Hair and Nails.—Various small derangements.

Affecting the Nerves of the Skin.—Nettle-rash, Prurigo, Shingles.

Affecting the Skin Proper.—Lichen, Erythema nodosum, Carbuncle.

No. 2. *Skin Diseases due to Failure of other Eliminating Organs.*

(*a*) *To Kidney Failure.*—Carbuncles, Boils, Prurigo, Lichen, etc.

(*b*) *To Lung Failure.*—Various small derangements.

(*c*) *To Liver Failure.*—Xanthelasma, Prurigo, etc.

(*d*) *To Failure in Lymphatic System.*—Lupus, Pemphigus, Lichen Scrophulosorum, Psoriasis, Impetigo, Pityriasis, Ichthyosis.

Unclassifiable Skin Affections.—Scleroderma, Elephantiasis (Leprosy).

No. 3. *Skin Diseases due to Parasites.*

(*a*) *To Vegetable Parasites.*—The Ringworms.

(*b*) *To Animal Parasites.*—Phthiriasis (due to lice), Itch.

DISORDERS OF THE KIDNEYS.

Functional Disorders.—Albuminuria, Chyluria, Hæmatinuria, Phosphaturia, Inflammation of the Kidneys, Polyuria.

Degenerations of the Kidneys.—Chronic inflammatory Bright's Disease, Waxy Bright's Disease, Fatty Bright's Disease, Cancer of the Kidneys, Scrofulous Disease of the Kidneys, Cystic Degeneration of the Kidneys.

CHAPTER XIV.

DISEASES DUE TO DEFECTS IN THE ORGANS OF THE FOOD SYSTEM.

V. AND VI. DISORDERS OF THE SKIN AND KIDNEYS.

V. DISORDERS OF THE SKIN.

Read in the light of what we already know, the diseases of the skin will present to us, in their study, no great difficulties.

The skin shares, with the lymphatic system, the kidneys, and the lungs (and to a slight extent also with the liver), in the removal of ordinary waste material from the body, and in the elimination therefrom of poisons. The derangements of the skin produced by overwork or unaccustomed work of this nature are, however, evident to the eyes of the flesh, and therefore occupy in the popular estimation a greater place than do those of the other eliminating organs whose lesions, due to the same cause, are only visible to the mental gaze of the physician, though none the less actually present.

Take any poison you choose, say that of scarlet fever. You witness the efforts made by all the eliminating organs to get rid of the poisonous products of fermentation set up by the micro-organism in the body, and you have in

nearly every case tangible evidence in the skin, lymphatics, and kidneys, and often in the lungs, of derangement resulting from the strain.

When, therefore, you see a skin eruption of any kind you know it can be but due to one of three causes—either to a poison in the blood, to a failure of one of the other eliminating organs and consequent overwork of the skin, or to a parasite that has temporarily made that skin its home.

The reader will at once be tempted to ask if some diseases of the skin be not due to want of cleanliness simply. The answer is, that uncleanliness can scarcely ever be viewed as a primary cause, being really a predisposing state, which determines the *part* of the body where the skin disease will appear, or appear first of all. If the body be in itself sound and be maintained by means of exercise, etc., in good health, almost any quantity of dirt on its surface can be well borne.

If I seem to devote too much space to such explanations, it is merely to prevent the reader from leaving the broad lines of physiological truth and getting into side issues that would land him in confusion.

(1) Skin Disease due to Blood Poisons.

(*a*) Due to Micro-organisms.

Under this heading come all the eruptions which characterize the fevers.

Their stay is very temporary. They are evidences of the effort made by the skin to eliminate the products of fermentation set up by the micro-organisms, and, as is conceded on all hands, it is well to adopt such measures as shall develop them.

(*b*) Due to Gouty Poison in the Blood.

Of these, certainly **Eczema** occupies the most prominent place. Persistent eczema in childhood, when not due to gross overfeeding, is nearly always either of scrofulous or gouty origin. In the vast majority of those cases in which it forms the plague of middle life it is gouty or syphilitic; in the aged it is almost invariably the result of gout, and is rendered at that stage of life often specially intractable by concurrent failure of the kidneys.*

Eczema is, in fact, *the* skin disease born of blood impurities. It is developed on the least provocation in those whose blood is surcharged with peccant material. Often a plaster applied to any part of the body is sufficient to determine an attack, which, at first local, gradually becomes general.

Eczema takes many forms—on the face, scalp, and body generally, that of a moist sore, which subsequently scabs over; on the lips and palms, that of fissures; on the tongue, that of a bright-red, inflamed-looking patch.

Closely allied to eczema, sometimes reckoned as a variety of it, we have **Ecthyma**, which assumes the form of multiple small, hard, distinct, boil-like excrescences which scab over.

Acne Rosacea (*Red Acne*), a combination of acne and eczema, is a very common sequel of gout. We are all familiar with its appearance, for it is the skin affection which produces those bright-red, inflamed pimples on the face, especially on the cheeks and nose, which disfigure many persons, and which is associated in the popular mind with alcoholic excess, though in reality many who are and have been from birth total abstainers and temperate liv-

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* Eczema, plus a history of dyspepsia, is nearly always gouty.

ers suffer from it. Alcoholic excess has but an indirect relationship to it, acting, as does any irritation in eczema, as a determinant, not as a primary cause.

The common form of Acne, by which name are described the pimples which at puberty appear on the face and across the shoulders, and which so often distress their possessors, is sometimes of gouty origin.

Nettle-rash and *Psoriasis*, diseases to be presently described, are also sometimes the offspring of gout.

The medical reformer who shall in the future undertake seriously to sweep the Augean stables of medical treatment will find in the department of the skin a large share of his work. He will see the eczemas and their allies, all speaking witnesses to a poison in the system, carefully pasted over and—silenced, not cured. Eczema and its allies are *brought out* by irritation, and they can be made to disappear, at least for a time, by appropriate soothing; but the patient is not cured or even benefited by this absurd course, while not unfrequently he is, as we might expect, rendered seriously ill, for the acute inflammation of the skin, called eczema, often takes the place of gouty inflammation of the joints, like it tending spontaneously to subside when it has rid the system of the uric acid; and to paste up eczema, to "drive it in," as the vulgar say, is on a par, in the matter of wisdom, with the application of ice-bags to a gouty toe-joint.

No, whatever poison be the *cause* of the eczematous enemy, its further manufacture in the body must be stopped and means taken to prevent its re-accumulation ere the physician can be entitled to take to himself the credit of a cure.

If gout be the poison, or if the latter be apparently the result of mere excesses in food or in certain articles of food—and under one of these headings nearly all eczema,

ecthyma, and red acne come—the following are the only roads to a cure :

(1) A simple and sufficient dietary from which all stimulating condiments, all "heating" and indigestible substances, must be eliminated. Sometimes it is necessary to forbid both sugar and salt.

(2) The avoidance of all alcoholic fluids.

(3) A well-ordered life with plenty of exercise in fresh air.

(4) Suitable clothing, which should be light and warm. Fine merino, silk, or unirritating woollen material to be worn next the skin.

(5) The functions of the skin to be well attended to. Warm baths (without soap) ; bran, gelatine, or weak alkaline baths are useful in many cases.

(6) Plenty of bland fluid, such as water, to be consumed, and plenty of fruit to be eaten.

(7) Two doses of some mild purgative (Carlsbad, Friedrichshall, or Hunyadi water) may be taken in half a pint of hot water, before breakfast, twice each week.

(8) If, after adoption of these measures, there is still some persistence of the eruption, a simple sedative ointment or powder, such as one of the following, may be employed :

Bismuth Trisnitrate	½ an ounce.
Oxide of Zinc Powder . . .	1 drachm.

Lanoline sufficient to make a perfectly smooth ointment. To be used thrice daily.

Oxide of Zinc	1 drachm.
Bismuth Trisnitrate	1 ounce.
Starch Powder	1 ounce.

To be dusted over the inflamed surfaces twice a day.

All crusts and scabs must be removed by soft-bread poultices ere ointment or powder be applied.

If the eczematous patch be old, dry, scaly, and thickened, a stimulant lotion may be applied to it. Thus:

One ounce, each, of oil of cade, of soft soap, and of rectified spirit, and two drachms of oil of lavender, may be mixed and well rubbed in once or twice a day.

Or, two drachms of solution of potash (liquor potassæ) may be added to two ounces of distilled water, and *firmly* applied for half an hour each day on linen till the scales soften and fall.

In acne rosacea, if the disease be well established, it is often useless to expect a cure from any medication. Equal parts of hazeline and lanoline are sometimes of use, but obliteration by a galvanic point of the small dilated arteries is usually the only local measure of avail.

I repeat once more that ointments, powders, and external applications generally, should never be had recourse to but to remove the last traces of irritated skin at the end of general treatment, the sole local treatment in the earlier stages being directed to the obviating of fresh local irritation, to which end no soap should be used to the patches of eczema, which should be protected even from the influence of air, light, and friction.

(*c*) Due to Syphilis.

From a disease which attacks with virulence the whole lymphatic system, almost every form and variety of skin affection may be expected.

This expectation is abundantly fulfilled in syphilis.

In the first stage the eruption is usually *roseolous* and *superficial*, akin to that observed in measles and epidemic roseola.

In the secondary stage, the eruptions—for they are generally many—may be *papular* (*i. e.*, consisting of pimples), such as *lichen* syphiliticus; or pustular (*i. e.*, containing

matter), such as *ecthyma;* or vesicular (*i. e.*, containing clear fluid), as *eczema;* or even squamous (*i. e.*, covered with scales), as *pityriasis* or psoriasis.

In the tertiary stage, or what is called tertiary syphilis—though it is in reality only a stage of bodily derangement consequent on the damage wrought by the syphilis which has disappeared—almost every variety of skin disease may, in different persons and at various times, be witnessed. *Rupia* is the only one which can be said, however, to have an exclusive claim to being purely syphilitic in origin. The eruption forms elevated *reddish-brown, cone-shaped crusts* on the skin, and when it heals it leaves well-marked and indelible pitting of the skin behind.

There is one characteristic whereby nearly every syphilitic skin affection may be diagnosed, a peculiar *coppery* or reddish-yellow hue of the eruption which is not seen in similar but non-syphilitic forms of skin affection.

The treatment is of course that for syphilis; local remedies are scarcely of any service, though sometimes, in the tertiary stage, strong local applications of the most potent caustics must be had recourse to to hold in check the advancing destruction of the skin and its underlying tissues.

(*d*) **Due to other and various impurities,** and classified according to structure of skin specially attacked.

Affections confined to the Sweat Glands of the Skin.—Of these there are three:

Hyperidrosis, an excessive secretion of sweat, local or general, accompanied often with decomposition of the secretion. This is most common in the feet.

Dysidrosis, or difficulty of sweating, a rare complaint, the retained perspiration causing the appearance under the skin of hard, painful, sago-like grains, a state of matters

usually confined to the palms of the hands, and not unfrequently attended by constitutional disturbances.

Sudamina, due to a temporary and slight retention of the sweat which is secreted in excess, the retained sweat forming numberless tiny vesicles. This disorder is seen in typhoid fever, in consumption, and in all complaints attended by profuse perspiration. It is common in lying-in women, in whom the red flush of the skin and the slight constitutional derangement which sometimes accompany the eruption may lead to a mal-diagnosis of scarlet fever. This sweat rash used to go by the title of "*miliary fever*," by which name it is still known in France.

Dysidrosis is too rare a disease to call for a description of its treatment at our hands ; sudamina requires no treatment. The only one we shall briefly advert to again is **Hyperidrosis**, in that form in which it affects the feet, *the treatment of which* is as follows : New stockings must be bought and frequently changed. The stockings used when the derangement appeared must be discarded. Cork soles should be worn in the boots, and dusted over lightly each day with boracic acid in fine powder. The feet must be well washed night and morning, and when dried carefully wiped over with the following lotion : Tannin, 2 drachms; rectified spirit, 2 ounces. When this has dried in they should be dusted over with powdered asbestos or starch-powder. The boots worn must be easy and light, and should be cut low to admit plenty of air to the feet. The above treatment is simple, cheap, and usually efficacious.

Affections of Sebaceous Glands of Skin.—Of these there are several.

Seborrhœa, producing a peculiar oiliness of the skin. Common in women who suffer from menstrual irregularities.

Comedones, by which name are described the small "black-heads" so common on the face.

Acne, a further stage of the last-mentioned derangement. The nodules are larger and red. They are seen on the face and back at puberty, and sometimes persist to middle life.

Acne rosacea, a further development of the same state.

Molluscum, an advanced variety of acne, the pimples of acne being here replaced by wart-like excrescences which contain a milky fluid, which is capable of transmitting the disease.

Boils (Furunculi).

Xanthelasma, consisting of yellowish patches of roughened skin, connected often with liver derangement.

The treatment of seborrhœa, comedones, simple acne, boils, xanthelasma, and molluscum resolves itself into the adoption of measures to improve the general health; that of acne rosacea has already been discussed under the heading of gouty skin affections.

Affections of the Skin Appendages — i. e., of Hair and Nails.

The *hair* may become *dry* and *fragile* from lack of general health; may *change color*, from age or local nerve influence; may *drop out*, from the attack of vegetable parasites or from constitutional depression — *e. g.*, from fevers — from age, and from hereditary predisposition.

The *nails* are often *longitudinally grooved* in gout, *transversely grooved* after severe acute disorders, *clubbed* in scrofula and chronic lung disease dependent thereupon, *fragile and softened* in syphilis, *shed* from result of injury or constitutional disorder, and *displaced* from the growth of parasite (*e. g.*, favus) beneath them.

Affections of the Nerves of the Skin.

Nettle-rash (Urticaria).—Most people have had some acquaintance with this disorder. It commences suddenly, the portion of the skin affected, a few seconds before quite clear, becoming suddenly the seat of *wheals*, resembling those produced by a *nettle sting*, but larger, which cause an *intolerable itching*. Sometimes within half an hour, and nearly always within half a dozen hours, the whole eruption has disappeared.

As a rule nettle-rash is the transient and unimportant disorder such as I have sketched ; occasionally, however, it becomes recurrent, returning again and again at short intervals, and ending in the production of a permanent irritability of, and a persistent crop of pimples on, the skin.

It is often due to the presence of gouty poison in the blood, and often to the presence of other and various poisons partaken of with the food, or actually manufactured by a deranged digestion from the usual nutrients. The eating of shell-fish is a common cause.

It is common in childhood and in adults with delicate skins, in the gouty, nervous, and rheumatic. It is rarely of any special significance, but sometimes is an indication of a break-up in health.

Treatment.—Of the transient variety, a purge, followed by a slightly lowered and cautious dietary, with a careful watch for any one article which, by idiosyncrasy of the patient, may in him cause the eruption.

In the chronic variety, all treatment often fails. If gout be suspected, the skin disease must be treated as an offshoot of that disorder ; if the nervous system be depressed —and this is frequently the case in this variety—means calculated to improve the general health will alone avail.

Iodide of potassium or bromide of potassium, either of which will often produce this skin disease in those free from it, are the best drugs to relieve symptoms.

A simple but efficient lotion to relieve the itching may be made of equal parts of glycerine and balsam of Tolu. It should be painted over the rash with a fine brush.

Bran baths (infuse 4 lbs. bran in 2 gallons or so of boiling water, strain in half an hour, and add 1 lb. of gelatine —fill the bath up with hot water to the required extent), soda baths (2 to 4 oz. of carbonate of sodium to be added to the hot water of this bath), or creasote baths (one to two teaspoonfuls of creasote mixed with an ounce or two of glycerine to be added to the ordinary warm bath), which, if they afford relief, may be repeated every second day for a time, are sometimes of avail in relieving the irritability of the skin. All coarse flannels worn next the skin must be discarded and replaced by silk or non-irritating and fine varieties of wool.

Prurigo is a term under which are comprised all conditions in which, without any apparent external cause, and without any eruption (or at most a fine papular one) other than that which results from scratching, the skin in larger or smaller areas becomes intensely itching. · This irritability is usually worse when the patient becomes hot.

The *treatment* of this condition is to seek the cause, which is often not far distant, and to remove it. In pruritus vulvæ in women this is often to be found in a congestion of the neck of the womb ; in pruritus scroti in men, often in gouty gravel lying in the bladder ; in pruritus ani of both sexes, the irritation of thread-worms is frequently enough at the root of the mischief.

In the aged, parasites are a common cause of skin irritation, and it must be remembered that the old and infirm, even if of fairly cleanly habits, are prone to their attacks.

Prurigo is common in jaundice and in diabetes, and is due then to impurities circulating in the blood.

Herpes Zoster (Shingles).—An affection of the nerves which supply the skin (and the muscles) of certain regions of the body, resulting in a characteristic eruption of *groups of red pimples*, which in a day or two are converted to *small blisters* and discharge their fluid, *forming crusts* which fall but leave *no scar* behind them.

As a rule, the disorder does not last more than ten days, and is sometimes ended in a week.

Shingles often appear on the upper lip, on the genitals, or above the eyebrow. When occurring on the trunk of the body the blister-like patches are large, and usually arranged one after another in a band, extending to half the circumference of the body.

Sometimes severe neuralgia precedes the eruption, and may persist for long after the latter has faded.

Treatment.—Protect the inflamed patches from irritation. No other treatment is necessary, the disease subsides of its own accord, and its duration is unaffected by any drug.

Affections of the Skin proper.

Lichen, a disease of the skin consisting in the development of *irritable pimples* (papules) commencing in limited patches and gradually extending, the individual pimples not enlarging and but rarely suppurating. The disease is not attended by itching. Lichen is a rare disease, but an exceedingly troublesome and intractable one.

Its cause is undoubtedly always to be sought in some blood poison, usually the product of mal-digested food, the result of chronic ill-health.

Treatment consists in elevation of the general health by exercise, warm baths, simple food, etc.

The only drug of any service is arsenic, which may be administered in the form of Fowler's Solution of Arsenic in three to five drops in water, thrice daily, after food.

Erythema nodosum.—Has no relationship whatever to either real erythema or to erysipelas.

It consists of elevated *red "bumps," itching or painful*, scattered usually over the front of the shin-bone, rarely seen on the face and arms.

Common in children and in young women. *Caused* by local irritation acting on impure blood. Not unfrequently in the subjects of it a rheumatic history may be traced.

Treatment of any sort is rarely necessary. Errors in diet and in mode of life must be rectified, and perhaps a simple purge may at first be, once or twice, administered. If the swellings be painful or irritable, one drachm each of chloral, camphor, and menthol may be rubbed up in a mortar to make a fluid which may from time to time be painted over the swellings.

Carbuncle (*Anthrax*) is a *real inflammation* of the skin, extending to, or commencing in, the underlying layers, and advancing with great pain and constitutional disturbance to slow suppuration.

It is caused apparently by various blood poisons, and certainly by the excess of sugar in the blood which characterizes diabetes, and by retention also in that fluid of nitrogenous débris from cells which the kidneys, from temporary debility or from chronic disease, are unable, with sufficient rapidity, to eliminate.

Unless the underlying cause be promptly found and removed, carbuncle is apt to recur or to become multiple, and may then endanger life.

Treatment must be directed to the removal of the blood contaminator. The carbuncle must be protected from

irritation, and its maturation should be favored by hot applications, such as poultices.

(2) Skin Diseases due to Failure of other Eliminating Organs.

(*a*) *To Kidney Failure.*

Hyperidrosis, sudamina, boils, carbuncles, prurigo, xanthelasma, lichen, and acne are often directly traceable to kidney failure, and occur as frequent complications in the course of chronic kidney disease. They have already been discussed under the head of poison-produced skin diseases, the poison in cases in which they depend on kidney failure being nitrogenous waste retained in excess in the blood-stream.

(*b*) *To Lung Failure.*

Any of the strumous skin disorders to be presently enumerated may be rendered more frequent and more intractable by the presence of chronic lung disease.

(*c*) *To Liver Failure.*

To some extent, by the way of the hepatic artery, the liver adds eliminating functions to its other manifold duties.

Xanthelasma and prurigo are often directly traceable to a failure in its eliminating department.

(*d*) *To Failure of the Lymphatic System.*

This failure is almost invariably due to the great enemy of this system—scrofula.

Of diseases already described, acne of the simple variety, comedones, eczema, and ecthyma, are often of scrofulous dependency, while of skin diseases more exclusively of this origin the following are the most notable examples:

Lupus, a chronic and formidable, but non-contagious,

skin disease, affecting especially *the nose* and cheeks, nearly always of scrofulous, but sometimes of syphilitic causation.

It commences in the form of one or more soft, dull-red elevations, often covered with scales. Two forms, distinct from each other only by their virulence, are known.

Ulcerating Lupus.—In this variety the elevations ulcerate, and the ulceration spreads, eating away sometimes a part of, sometimes the entire, nose.

Non-ulcerating Lupus.—In this form the elevations do not ulcerate, or do so only to a slight extent, but shrivel, leaving white, scar-like patches of skin behind.

Treatment.—In both varieties every means must at once be taken to improve the general health. It is emphatically not a disorder to be trifled with, for it may spread rapidly. Of local applications, the non-ulcerative form scarce calls for any. The following stimulating application is, however, often of service: Take of soft soap 4 oz., of rectified spirit 2 oz., of rosemary spirit 2 dr. Mix to form a lotion. Pour a small quantity on a piece of flannel and rub it well into the swellings each night, applying afterwards some soothing powder (starch-powder, trisnitrate of bismuth, etc.), or ointment (ointment of the oleate of bismuth.

The ulcerative form must be actively and resolutely attacked. The patient should be put under ether, and the ulcer scraped with a special, sharp spoon or destroyed by electricity.

Pemphigus.—A skin disease, marked by the appearance on the trunk or limbs (rarely on the face, soles, or palms) of isolated *round blisters*, sometimes two or three inches in diameter. The fluid in the blisters gradually *darkens* the blister, which finally shrivels and disappears. Pemphigus is often attended by slight fever.

Usually a mild complaint, disappearing spontaneously in a few days, but sometimes attended by great nervous prostration and then apt to be serious.

Relapses are not uncommon.

Caused often, but not always, by scrofula or syphilis.

Treatment.—Anti-scrofulous or anti-syphilitic, as the case may require. If of neither origin, the disease had best be left alone, for its course is then not likely to be favorably affected by any medicine.

Lichen Scrophulosorum.—A rare disease, seen only in the scrofulous, and marked by the appearance, generally on the trunk, of successive crops of large red pimples (papules) often attended by swellings of the contiguous glands.

Treatment.—That of scrofula. Local applications of a soothing nature, ointment of the oleate of bismuth, or carron oil, are often called for.

Psoriasis.—A chronic, non-contagious skin disease, affecting mainly the arms and legs, but not uncommon on the trunk and on the scalp, appearing often as a fringe to the line of hair surmounting the forehead.

Characterized at first by the appearance of large circular or ovoid red patches on the skin, upon which fine scales gradually form.

Caused commonly by scrofula and syphilis, but not unfrequently of independent origin.

Remarks.—Psoriasis is a common skin affection, sometimes terminating in a fortnight, but more often persisting for months and years, and recurring when driven back.

Treatment of Chronic Cases.—Improvement of general health. Arsenic (three to five drops of Fowler's Solution of Arsenic in a wineglassful of water thrice daily, after meals.)

Local measures.—The following, in the order given, are the best applications :

Chrysophanic acid, 15 gr.; lard, 1 oz. Mix.

Pyrogallic acid, 20 gr.; benzoated lard, 1 oz. Mix.

Thymol, 10 gr.; vaseline, 1 oz. Mix.

Such ointments are useful, and, since psoriasis is one of the diseases most difficult to rid the skin thoroughly of, are often used with justification. They should be applied twice a day to the old patch or patches of psoriasis only, and never to surrounding skin, nor to recent patches, nor to eczematous eruptions.

It must be added that though the chrysophanic-acid ointment is by far the most efficacious, it irremediably stains the under-clothing, and may sometimes produce a considerable amount of erythema.

Impetigo.—An acute and somewhat contagious skin affection, commonly seen on faces of scrofulous and ill-fed children, and sometimes in adults, and consisting of many single or clustered pustules, which tend to run together and to be covered by a thick, yellowish scab. From below the scab discharge flows. The crusts get thicker and larger and fall off, leaving a raw surface. It is accompanied by enlargement of the neighboring lymphatic glands.

Confined almost exclusively to the face and head.

By many impetigo is reckoned but a variety of eczema. The treatment is the same in both diseases.

Pityriasis (Dandriff).—A mild, non-contagious skin affection, marked by some irritation, and the production on the surface of fine white scales that separate. Is exceedingly common on the scalp, but may also occur in reddish patches on the body.

Its treatment consists in the adoption of measures to improve the general health. Arsenic in small doses may

sometimes be taken with benefit. The scales may be removed by soaking the affected part each night, for three or four consecutive occasions, with glycerine of borax. Washing with a strong solution of borax and hot water will sometimes suffice.

Ichthyosis (or Fish-skin).—A chronic skin disease, often congenital, marked either by a dry, harsh, *scaly condition* of nearly the entire skin, or confined to certain portions, usually the legs and arms only.

The size of the scales varies much.

Caused often by scrofulous or syphilitic hereditary taint.

Treatment.—None.

Four Unclassifiable Skin Affections.

Fibrosis of Skin.—The skin may, like the liver and the lungs, become the seat, often without apparent cause, of an overgrowth of fibrous material. When occurring in patches, which tend to spread, it presents the exact appearance of a scar resulting from a burn, and is then called *scleroderma;* when it attacks not only the face and hands, but also the kidneys, liver, and nervous system, it is called *myxœdema.*

The latter form is a very grave complaint, terminating slowly in death; scleroderma is much less dangerous, but as it progresses becomes exceedingly troublesome and results in great deformity.

Both forms of this disease are doubtless caused by some constitutional state at present unknown, and both are beyond the reach of cure.

Elephantiasis of the Greeks, or **Leprosy**, and **Elephantiasis of the Arabs**, are two skin diseases not so nearly alike in characteristics as to justify the similarity in name. **Leprosy** is almost certainly of the nature of an endemic fever, is

contagious, and is marked by the formation of *nodular patches* on the face and trunk, which tend to increase in size and to become more numerous, causing *great disfigurement* (leonine face). The disease terminates slowly in death by exhaustion.

The Elephantiasis of the Arabs is non-contagious and not endemic, and is usually limited in its seat of attack to the legs and lower abdomen, the skin of which parts becomes so enormously thickened that the foot and leg come to resemble those of an elephant.

In each disease has a special micro-organism been found in the blood.

The utility of any *treatment* in the former disease is a matter of great doubt; of the latter, it is surgical, some improvement having occasionally been effected by ligature of the main blood-vessel of the affected limb.

(3) Skin Diseases due to Parasites.

(*a*) Due to Vegetable Parasites.

Honeycomb Ringworm (Tinea favosa).

Caused by the growth within the hair follicles, and on the skin, of a fungus called the *Achorion Schönleinii.*

Characterized by inflammation of the skin of the affected part, *destruction of the hair* of the region, and the formation of a succession of rounded *minute cups,* the whole bearing a strong resemblance to a honeycomb. The eruption has a peculiar *mousey smell* which is quite characteristic.

Remarks.—The eruption is generally confined to the scalp, and is rare in England, but common in Scotland. It often results in permanent baldness.

Common Ringworm (Tinea tonsurans).

Caused by the growth within the hair follicles, in the

substance of the hair, and on the skin, of a fungus called *Tricophyton tonsurans.*

Characterized by the formation of an elevated oval or round ring of inflamed skin which spreads at its margins and is paler, and often a little scaly, in the centre. If it affect the scalp it leads to patches of baldness, the hairs not being absent, but broken off short near the skin.

If it affect the beard, moustache, and whiskers, ringworm assumes a distinct appearance. The rings formed are then not complete, but run together, and pustules form at the roots of the hairs, which do not fall off readily, but are so loosened as to be easily pulled out. Ringworm is then known as **Sycosis.** It is communicated commonly at the shops of lower-class and careless barbers, being carried by the razors in use.

Occurring inside the thighs and on the back of the neck, ringworm will often assume the appearance of an *irregular reddish patch*, whose outline is formed by sections of rings.

Remarks.—The form that attacks the hair of the face, and that is therefore only seen in adults, is exceedingly obstinate, and the irritation set up by it leads often to a secondary superimposed eczema, which masks the real malady.

Treatment of all Varieties of Ringworm.

(*a*) *Constitutional.*—As ringworm rarely attacks any but weak or scrofulous individuals, cod-liver oil, fresh air, and simple, good, nourishing food are the first measures, those without which many cases will remain intractable.

In a parasitic disease local measures must, of course, be had recourse to.

In honeycomb ringworm the following is at once safe and certain :

Hyposulphite of Sodium	½ ounce.
Sulphurous Acid	½ ounce.
Distilled Water	1 pint.

This may be applied two or three times daily.

All scabs are to be gently removed by means of soft, warm bread poultice, and all affected hairs must be pulled out with proper epilating forceps. The looseness of the hair renders this process nearly painless. Absolute cleanliness is necessary, and the wearing of a soft, light linen cap, which should be changed every second or third night, is advisable, at least at night-time.

In simple ringworm much discrimination in treatment is necessary to effect a cure.

If it occur on the body, one brushing over with *pure* carbolic acid usually suffices; but if the skin be delicate, an application every third or fourth day of equal parts of glycerine and carbolic acid is to be preferred. If the disease appear on the scalp, the treatment must be graded to the condition. In any case the hair should be cut everywhere quite short, and the whole head washed once a day with strong borax water (½ oz. borax dissolved in a cupful of hot water). The rest of the treatment will depend on the condition of the patches. If these be red, and have been inflamed by strong applications, then Coster's paste is the best. It is thus made : Take of iodine 2 dr., and dissolve it in 1 oz. of decolorized liquid oil of tar. The patches to be brushed over with this once every four or five days. If, however, the patches be dry, hard, and indolent, the following is better: Carbolic acid, 2 dr.; glycerine, 6 dr. Mix, and apply with a brush to the patches each night. If the broken hairs on the affected patches can be drawn out easily, it is best to do so.

In mild cases the ointment of the iodide of sulphur, applied twice a day, often suffices.

Tinea Versicolor (Liver Spot).

Is *caused by* a fungus called the *Microsporon furfur.*

Characterized by the appearance of yellow patches, covered with fine branny scales, usually on the front of the chest and abdomen, tending to spread, and often itching.

Treatment is as follows:

Once a day the patches are to be well washed and scrubbed with black soap or carbolic soap, and twice each day to be brushed over with equal parts of sulphurous acid and glycerine. Small quantities only of this lotion should be purchased, as it is essential to efficacy that the sulphurous acid be fresh.

(*b*) Due to Animal Parasites.

Lice.—For their removal from the hair the following lotion is singularly efficacious:

Corrosive Sublimate	12 grains.
Rectified Spirit	1 ounce.
Oil of Roses	1 drop.
Distilled Water, up to	6 ounces.

Make a lotion: label "Poison."

The head to be sponged twice a day with this.

Scabies (Itch).

Caused by the presence of a parasite (the *Acarus scabiei*) which irritates the skin, and the female of which burrows and deposits her eggs beneath the surface.

Characterized by intense itching, which becomes worse as the body becomes warmer, by a fine eruption of pimples, most marked between the fingers and the toes, and by the appearance of the tracks formed by the female in burrowing.

Treatment.—Each night a hot bath is to be taken, and the body to be well scrubbed with some strong soap, after which and *all over the skin*, one of the following ointments or lotions is to be well rubbed in:

(1) Liquid storax, 4 oz.; rectified spirit, 1 oz.; olive oil, ½ oz. Mix.

Or (2) Green soap and lard, of each 1 lb.; chalk, 4 oz. Mix.

Or (3) Carbonate of potassium, ½ oz.; precipitated sulphur, 1 oz.; simple ointment, 4 oz.

Three or four applications ought to cure. The clothes, bedding, etc., ought either to be boiled, or, if that be impossible, to be thoroughly cleansed with some disinfectant. If this precaution be not taken the parasite will return.

We have now completed our study of diseases of the skin, and it is clear that, under the classification which I have adopted, the subject, one of the most perplexing for medical men, becomes clear and intelligible.

All disease, I hold, should be classified according to its cause, for a knowledge of the latter suggests at once the real measures to be adopted for treatment. But before much can be done the nomenclature of disease must be revised, and no disease in future ought to be named according to a prominent symptom only. This leads to endless confusion, and too often to the reduction of treatment to a foolish contest with a symptom, which itself is a benefit!

All skin eruptions (except the parasitic ones) are benefits to the *diseased body* which produces them, for they do not occur on healthy ones; while perhaps even for the parasitic ones some philosopher of the future may find a word of praise, since even they are confined almost exclusively to debilitated and already disordered subjects.

The sufferer from skin disease must always bear in mind that, though the eruption may be recent, the underlying cause of his complaint is not of yesterday, but the product of years; and in his attempts at a radical cure he must not expect a very rapid recovery, though if he be content with a temporary *disappearance of a symptom of his malady*, for such the skin eruption is, he may obtain such questionable benefit often, by the steady use of unguents and lotions, in the course of a few days.

VI. DISORDERS OF THE KIDNEYS.

Functions of the Kidneys.—To separate from the blood, and to expel from the body, cell-waste (represented by urea and uric acid), together with water and certain salts which have fulfilled their function in the body.

The manner in which this is done is simple enough. The water and probably most of the salts are simply filtered through the fine walls of the capillary blood-vessels in the kidney and pass into the tubules of the organ, which convey them off. The urea and uric acid (and perhaps certain of the simple salts) are at the same time withdrawn from the same fine blood-vessels by the action of the special cells which form the walls of the tubules.

The latter function may be regarded as the *special* duty of the kidneys, as certainly it is the most important one; it can be performed vicariously and efficiently by no other organ, and therefore its arrest is *the* danger to be feared in kidney disease, the body in such a case being poisoned by its retained effete matter.

In many diseases of the kidney the amount of water and salts, such as phosphates, chlorides, etc., may be throughout normal or even constantly in excess, and as a result the urine will be clear, even clearer than normal, while nevertheless the special kidney function of which I have

spoken is becoming slowly arrested and leading surely to an arrest of life.

Abnormally clear, limpid urine then tells us, as a rule, nothing of any importance about the state of the kidney, while *thick urine* only informs us that, from some cause or other, probably from defective blood pressure in the kidney, the relative amount of water is diminished. The *color of the urine* tells us much more: it may inform us at first sight that certain salts are being passed out in excess, or it may show us the presence of a foreign element —*e. g.*, bile; still, even, it does not tell us what we would know, the amount of urea present, nor does it, unless uric acid be grossly in excess of the normal, inform us at all as to the amount of the latter substance which is before us.

Chemical analysis and microscopic examination alone are competent to furnish *all* information as to the urinary constituents, and it will, very often indeed, give us a very complete knowledge of the patient's general health as well as of the functional activity of his kidneys, ere yet, perchance, we may have had any opportunity of seeing and examining him.

It is impossible in the very limited space at my command, to discourse, as I think I could profitably, and certainly would willingly, on all the useful indications of the general state of the body to be read in an analysis of the urinary secretion, and I therefore am compelled to restrict myself to short observations upon certain usual and unusual ingredients only. The first of these is *albumen*. We know how among the cells, albumen—*i. e.*, serum albumen, together with various salts—oozes out of the capillaries that go to supply them. In the kidney we have seen that water and salts *only* thus escape, though the capillaries are precisely the same in structure. The cause of this difference is to be found in the blood pressure of the two

parts, that in the kidney being, in health, considerably the lower. But albumen does occasionally appear in the urine and constitutes the symptom known as *albuminuria*—how can this arise? Clearly in one of two ways: by an actual disease in the kidney, or by a *mere* increase of pressure in the capillaries, the result of an (often temporary) increase in heart power. It may even occur in other ways, for if the digestive system be not in first-class order, or if it be overworked, albumens (*e. g.*, peptones) that transude more easily than does serum albumen may be present in the blood-current, and thus again we may have albuminuria, more or less persistent while of but trifling importance. Within late years, thanks mainly to the investigations of Professor Grainger Stewart, we have learned that albuminuria, far from being in itself a sign of kidney disease, and therefore a rare symptom, is one of the commonest occurrences in the life of healthy persons. When, and *only when*, in addition to albumen, there are found in the urine the cells of kidney tubules or portions of the tubules themselves, is there cause for alarm, just as when, in lung disease, with the sputum expectorated are found actual portions of the lung substance.

What we have seen take place in the case of albumen may and does also occur in the case of sugar, with this difference, that organic kidney disease does not increase perceptibly the output of sugar by this channel. Increased heart pressure, however, has the same effect as in the case of albumen; it *alone* is often enough the sole cause of glucosuria, telling as it does both on the liver, where the transformation of animal starch to sugar occurs, and on the kidney circulation.

And what occurs in the case of grape-sugar may even take place in that of fat, which, in an emulsified form, or as oil, is an occasional ingredient in urine.

Blood-pigment, with a few red-blood corpuscles, may be found in abundance in the urine, giving it a strongly smoky hue (**Hæmatinuria**). This may indicate disease of kidney of an advanced kind, or a mere exudation of blood, the result of a stone in the kidney, or may be the sequence or concomitant of malarial fever, and is then probably due to a derangement in blood formation, the outcome of those changes in the spleen which characterize the agues. Even sometimes mere errors in diet, exposure to cold, or excessive exertion, may, in a way not to be easily accounted for, produce this symptom. The outlook and the treatment must be judged of by the cause.

Chyle, the milky fluid found normally in the lymphatics, often pinkish in hue from admixture with a little blood-pigment, will sometimes be present in the urine (**Chyluria**). This may be due to rupture of lymphatics in the kidney, the presence of a parasite (the *Filaria sanguinis*) in the blood, or disease of the kidney itself. The outlook is generally grave. The presence of fibrin, which is mingled with the chyle, makes chylous urine easily coagulable.

Phosphates may be in great excess, and may indicate merely considerable recent brain-work and consequent increase of the peculiarly phosphatic débris of nerve cells, or may show a tendency to deterioration of the nervous system. In the latter case this symptom constitutes a little known but important disease (**Phosphaturia**), which is accompanied by general depression, lapse of memory, muscular exhaustion, etc., but which, if noticed in time, may, by the adoption of measures to improve the general health, be cured. As a temporary condition, phosphaturia is common in young men.

Uric Acid and Urates.—Here again we come across uric acid and its salts, the urates, which in health are, in

small quantities, normal constituents of urine; which, when in excess of the normal, indicate surely that break-down known as gout, but gout with kidneys active enough to keep its ordinary symptoms down; which again, when *deficient in amount*, after having been present in excess, mean a temporary strike of the overworked kidney cells, retention of the poison in the blood, and approaching gouty attacks of the joints, stomach, skin; upon which, when these strikes have been frequent and prolonged, will ere long ensue failure of the renal powers—in other words, *gouty Bright's disease*, and slow but certain poisoning of the body.

Uric acids and the urates are, in their pure state, generally amber-colored, but their affinity for the natural pigment of the urine transforms them usually into cayenne-pepper-like or brick-dust deposits, sand or gravel, which, retained in the kidney, may form small stones there, and thus occasionally lead to abscess and destruction of the organ; or, passing down to the bladder, may either be voided, or, remaining in that cavity, increase gradually in size.

Of other abnormal urinary ingredients may be noted bile-pigment in liver derangement and jaundice, pus in abscess of the kidney or of other parts of the urinary passages, mucus in severe bladder derangements and fresh red blood from the bladder or urethra in some acute disorders.

Functional Disorders of the Kidneys.

With most of these we have already dealt in discussing the urine. Two only remain for distinct mention.

(*a*) Inflammation of the Kidneys.

A rare disease, except, as following on sudden check to

the action of the skin in the drunken, where the kidneys have been systematically overworked, or in the fever-stricken, gouty, scrofulous, or otherwise delicate, in whom the kidneys are predisposed to disease or working under difficulties.

Characterized by shivering, fever, *diminished urination*, marked *vomiting*, the result of the kidney failure, by the appearance *of albumen* and *blood in the urine*, and by *dull pain* over the lumbar region.

Resulting in favorable cases in recovery; in other cases in death, the result of the kidney failure; in many, in chronic disease of the organs (chronic inflammatory Bright's disease).

Treatment.—Assist, by frequent hot baths, and by subsequent rest in hot, dry air, the action of the skin.

Leech, blister, cup, or persistently poultice the lumbar region.

Keep the diet low, especially in meat and its preparations, remembering that the kidneys are working badly; allow plenty of hot water and bland diluents to assist in washing out the kidney tubules. Keep the bowels in free action.

Be exceedingly cautious not to stimulate, by means of drugs, the kidney functions.

Give ice and trisnitrate of bismuth to prevent exhaustion from excessive vomiting.

(*b*) Polyuria,

sometimes misnamed **Diabetes Insipidus**, is a condition of the kidneys in which a large excess of water only, *the other constituents being normal*, transudes from these organs and is voided.

It arises from a dilatation of the blood-vessels of the kidney, the result of defective nerve-power, and is analo-

gous to the condition in the liver which is a cause of real diabetes. It exists as a transient state in hysterical women, especially towards the change of life, and is sometimes in men the sequence of great mental overwork (as is frequently real diabetes). In the hysterical it is generally quickly recovered from, and is unattended often by any secondary symptoms; in other cases it lasts much longer, and is apt to remain as a permanent condition, producing as its consequences, thirst, debility, gastric and intestinal derangements, and sometimes an excessive craving for food.

Remarks.—The state of the urine in polyuria offers a marked contrast to that in diabetes, for in polyuria there is neither sugar nor albumen nor excess of urea present in the water passed.

Treatment.—Avoid causes of worry and great mental effort. Improve the general health.

Degenerations of the Kidneys.

Of these there are four special varieties, known from their first classifier, Dr. Bright, as **Bright's Diseases.**

(*a*) *Degeneration, the consequence of preceding kidney inflammation* (known otherwise as *chronic inflammatory Bright, gouty kidney, cirrhotic kidney, contracted kidney,* etc.).

Of this form there are three subdivisions, often unnecessarily separated and dealt with as distinct diseases, the distinction being based on the locality and extent of the inflammatory process which has set on foot the degeneration. Thus, if degeneration succeed to acute general inflammation of the tubules and fibrous stroma of the kidneys, it is styled **chronic inflammatory Bright**; if it succeed to a similar inflammation which attacks more especially the little tufts of blood-vessels, etc., the so-called "Malpighian

bodies," and is the result of scarlet fever, etc., it is styled "**chronic infective inflammatory Bright;**" while finally, if it be the sequence of that slow inflammation of the kidneys which limits its ravages largely to the fibrous stroma, and which is so often caused by gout, it is known as "**cirrhotic Bright**" or "**gouty Bright.**"

Each of these subdivisions of chronic inflammatory kidney mischief has certainly its own special characteristic, but all agree with one another in the main, and may, therefore, be grouped together.

This disease is *characterized* sometimes, if of gouty origin, by a very insidious, and sometimes, as in the other forms, by a sudden, commencement, though with very few exceptions it may be said that the patient is usually unaware for the first few months, or even years, of the fact that any grave kidney lesion is present. Signs of *dyspepsia*, *headache*, a *marked tendency to perspire*, *pallor of the skin*, and a *bloated appearance of the hands*, and particularly of the *lower eyelids*, and *palpitation*, are perhaps in that period of comparative health occasional symptoms. Then are witnessed fairly frequent attacks of *acute stomach derangement*, accompanied by *severe retching*, and commencing without assignable cause, but often preceded or accompanied by a marked temporary decrease in the amount of urine secreted. The heart's action continues *violent* and *anæmia advances. Dropsy is rarely prominent*, except in a very mild form and quite towards the end. The nervous system becomes affected, and not unfrequently there are witnessed violent *convulsions*. The eyesight becomes impaired. Finally the patient dies, usually from some secondary mischief, such as *pleurisy*, *erysipelas*, *bronchitis*, or *pneumonia*.

Such is a very brief and general sketch of a disease which may extend over fifteen or twenty years, and which

acts by poisoning slowly the whole body by the gradually increasing barrier it opposes to the passage from the body of nitrogenous waste. This retention within the body of urea is styled uræmia.

(*b*) *Degeneration of the waxy form*, the consequence of prolonged bodily weakness (known as **waxy Bright's disease**).

In the strict sense of the word this is not a kidney disease proper, but is a mere local manifestation in the kidney of waxy degeneration proceeding more or less generally throughout the body.

Characterized by a history of severe syphilis, of bone disease, of prolonged and exhausting discharges, or of long-continued illness of other forms, and marked by an increased flow of clear urine that always contains albumen, by gradual decrease of strength and great anæmia, and often by many signs of disease due to degenerative changes proceeding throughout the body.

Resulting slowly in death.

(*c*) *Degeneration of the fatty form*, the consequence of bodily weakness and of mal-nutrition (known as **fatty Bright's disease**).

Like the preceding complaint, fatty Bright's disease is not a kidney disease in the real sense of the word, but only one portion of a general bodily degeneration.

Characterized by rapidly increasing debility and pallor, often combined with a puffiness of the face and whole body, by frequent micturition, the urine being generally clear and limpid, but always markedly *albuminous, dyspepsia*, attacks of *severe vomiting*, and a *gradual loss of eyesight.* Towards the end, *convulsions and general dropsy*, which extends to the internal organs, and especially to the lungs, pleuræ, and pericardium, and thus terminates life, is the common sequence of events.

The *treatment* of all forms whatever of kidney degeneration resolves itself simply into the adoption of measures to prolong life. The skin and lungs must, of course, be kept in good functional activity, and therefore the patient should, if possible, seek in winter a warm climate. The skin must be clothed with silk or flannel. The diet must be sufficiently nourishing, while not being too nitrogenous. Bland fluids may be taken to any extent, and occasionally a mild diuretic mineral water, such as that of Contrexéville or of Eviens, is called for. Alcohol must be imbibed with great caution. The bowels are to be maintained in functional activity.

Among other organic diseases of the kidney are reckoned **Cancer,** the symptoms of which are pain, plus the other general signs of kidney failure. Unlike the degenerations we have discussed, it attacks at first but one kidney. **Strumous disease of the kidney** is spoken of by most writers as a special degeneration, and it has certainly the same claim to that designation as have fatty and waxy Bright's disease, being, like them, the local expression, in what happens in the patient to be the weakest part of the body, of a general scrofulous degeneration. Its symptoms are those of fatty Bright's disease, but, as a rule, are more severe and more quickly fatal. It attacks simultaneously both kidneys. **Cystic degeneration** of the kidneys, a state of matters in which a number of, usually small, cysts form in the kidneys, is yet another disease sometimes seen, and due usually to a blocking of the tubules of the kidneys and a resulting expansion of them.

Finally, hydatid cysts, containing numberless immature tapeworms, may form in the kidneys, as in the liver and other organs of the body.

CHAPTER XV.

DISEASES DUE TO DEFECTS IN THE ORGANS OF THE FOOD SYSTEM.

Disorders of the Lungs, Throat, and Windpipe.

FUNCTIONS AND STRUCTURE OF THE LUNGS.

Functional Disorders of the Lungs:

(*a*) Bronchitis (coarse variety).
(*b*) Bronchitis (fine, capillary form).
(*c*) Pneumonia.
(*d*) Pleurisy.

Degenerations of the Lungs:

Consumption (tubercular form).
" (inflammatory form).
" (fibroid form).
Cancer.
Mortification.
Abscess.

Other Conditions of the Lungs:

Asthma (a nerve derangement).
Bronchiectasis (a dilatation of the bronchial tubes).
Emphysema (a dilatation of the air-cells).
Collapse (a mechanical arrest of function).
Congestion (a transient or permanent condition of the circulation).
Hæmoptysis (a symptom).

Disorders of the Throat:

Derangements of the tonsils.
The inflamed, relaxed, or congested throat.

Disorders of the Larynx:

Inflammation of the larynx (in children productive of real croup).
Congestion of the larynx.
Spasm of the larynx (false croup).

CHAPTER XV.

DISEASES DUE TO DEFECTS IN THE ORGANS OF THE FOOD SYSTEM.

VII. DISORDERS OF THE LUNGS.

The functions of the lungs are twofold. Firstly, they assist in removing carbonic acid and water, the products of the combustion of fuel-food, from the body; and, secondly, they replace the carbonic acid thus withdrawn by oxygen, by means of which gas the combustion of all food within the body is performed.

Of what vital importance then to man is a healthy state of the breathing apparatus, and to what general disaster will not even a trifling breakdown of it lead!

Lessen by ever so little the power of the lungs to take up oxygen, and at once all the processes of life suffer a proportionate arrest.

And yet how easily, and from how many quarters, may derangement attack the lungs! Rich in lymphatic ducts and glands, and enveloped in large lymphatic cavities (the pleuræ), *scrofula*, *syphilis*, *rheumatic fever*, and every derangement that tells, directly or indirectly, on the lymphatic system, threaten their integrity from a thousand points; while every poison, living or inanimate, that cir-

culates in human blood, must many hundred times a day pass through their delicate meshwork of air-cells, which they rarely fail to disorder and sometimes to destroy.

But more than this: the lungs depend directly for a regular blood supply on the perfection of the heart, one half of which latter organ is constantly engaged in supplying them with the vital fluid, while the other half is occupied in receiving it as it comes back re-oxygenated, and in pumping it to the body at large. A diseased heart, then, must mean a hampered, and in time a diseased, pair of lungs.

Once more: the lungs give off water vapor, actually visible to us in cold weather, and the kidneys and skin are also, among other duties, engaged in the same way. Check, then, suddenly the action of either of the latter organs, as is so often done by allowing the sudden impact on a large surface of the body of cold air, or, still worse, as further impeding skin transpiration, cold and damp air, and you have, as a very natural consequence, increased duty thrown on the lungs, and, unless these latter organs are in first-rate working condition, you engender very easily some one or other of the forms of lung disease. Cold and damp are, then, not actual first causes of lung affection, but are the developing agents, bringing out in the delicate generally, and especially in the scrofulous and in those not habituated to the influences of damp and cold, lung disorders, due, of course, to pre-existing weaknesses there, weaknesses which, with care and prudence, might never have appeared to threaten, and perhaps destroy, a life that was with difficulty, before the attack, facing the dangers that menaced it.

A word as to the structure of the lungs. Imagine a short bush, the smaller twigs of which are crowded with leaves; imagine the trunk, branches, and leaves to be all

hollow, and if you call the short trunk the trachea, the large branches the big bronchial tubes, the twigs they give off the small bronchial tubes, and the hollow leaves in which they terminate the air-cells, you have a very complete idea of a lung, such as it would appear if suddenly cut in half when full of air, excepting that all the space between each branch or branchlet and between each leaf is filled in with blood-vessels, lymphatic ducts, and that fibrous binding material which here, as everywhere else in the body, surrounds and maintains firmly in each place each and every other tissue.

Now, disease may commence in any one of the above parts; if it be of an inflammatory nature, and it attack the trachea and big bronchial tubes, it is called **Coarse Bronchitis**; if it attack the smaller tubes, **Fine Bronchitis**; if it attack the air-cells and the binding material with its contained lymphatics and blood-vessels, it is called *inflammation of the lungs*, or **Pneumonia**; while, if it attack the large lymph sacs (the pleuræ) in which the lungs rest, it is called **Pleurisy.**

If the disorder be of a degenerative type, and, as in scrofula, be located first in the lymphatic ducts and glands external to the bronchial tubes and air-cells, which then ulcerate and break down, it is called **Tubercular Phthisis** (or *rapid consumption*); if it be situated mainly, or indeed solely, in the fibrous binding material, which, when inflamed in any part of the body, first swells and then shrinks and strangles all that it envelopes, it is called **Fibroid Phthisis**; if it be the consequence of severe inflammatory disorder of the nature of fine bronchitis or of pneumonia, it is styled **Inflammatory Phthisis.**

As other examples of degenerative type we may have, but rarely, **Cancer of the Lung, Abscess of the Lung,** or **Mortification of the Lung.**

Then a derangement of the nerve mechanism of the lungs may produce disorder, a variety of spasm of the bronchial tubes, known as **Asthma.** An over-stretching and permanent dilatation of the air-cells and bronchial tubes, secondary results of many lung disorders, especially of chronic asthma, are called, the first **Emphysema,** the second **Bronchiectasis.** Then we have the rare condition of **Collapse** of a portion of the lungs, due to block of the main bronchial tube going to it.

A state of **Congestion of the Lungs** is an exceedingly common one, and indicates a mere over-supply of blood to the lung; this may arise from some temporary cause, and be of no consequence; may indicate the first commencement of pneumonia, and mean coming mischief; or may be quite chronic, and due then usually to imperfect action of the heart, in which case it will, though but slowly and gradually, lead to death, or contribute to a fatal termination.

We are now fairly in position to understand and appreciate the influence of apparently different causes in the production of each single disease of the breathing apparatus, and therefore to render necessary but a comparatively brief and simple description of the special characters of each one.

The Functional Disorders of the Lungs.

(1) **Bronchitis,** of the ordinary coarse variety, affecting the larger bronchial tubes only or mainly.

This disease varies greatly in severity, from a mere light bronchial catarrh, recovered from in a few days and often seen in really healthy persons who take a little too much care of themselves, and who therefore contract this affection from a comparatively slight indiscretion, up to severe acute bronchitis, the expression of some long-tolerated

impurity or impurities in the blood and threatening life by the high fever it produces and the grave impediment it offers to the efficient action of the lungs, brought out by a slight chill, or perhaps developing without even that provocation.

It must always be borne in mind that, whenever there is poison in the blood, whatever be its nature, there is grave danger of bronchitis, or of other inflammatory lung affection, and that a very slight exposure then suffices to its production.

There are three characteristic stages in bronchitis.

First Stage.—In this stage the mucous membrane of the bronchial tubes is red, swollen, and congested, and, as a consequence, we have *feverishness*, a sense of *rawness behind the breast-bone*, *quick breathing*, and a *dry, frequent cough*. Sometimes in this stage there is a marked sense of suffocation.

Second Stage.—In this stage, which in a day or two succeeds the first, the mucous membrane begins to exude at first *thin, serous-looking fluid*, and then mucus, with which comes a *sense of relief*, all the symptoms *improving*, the cough becoming *less frequent, less tickling, and moist;* the *expectoration of mucus* every day growing easier.

Third Stage.—In this stage the exudation from the mucous membrane of the bronchial tubes becomes even more copious, being sometimes yellow or green. There is in favorable cases a further relief in this stage from urgent chest symptoms, but *debility* is, as we might indeed expect, more marked.

The three stages usually last from a week up to a month or so, when convalescence slowly sets in.

In many cases, however, especially in the aged and broken-down, or in the unhealthy, the stage of convalescence is never reached. In them the symptoms, with care, may

ameliorate, becoming less urgent and troublesome, but actual recovery does not take place, the patient improving in warm, dry air and with suitable food, to relapse again under adverse conditions. This is called **Chronic Bronchitis.**

The prognosis in bronchitis depends on the underlying cause of the attack, the extent of the disease, and the strength of the patient. According to these, bronchitis may mean much or little. In the subjects of kidney disease, in those attacked by malignant fevers, and in the diabetic, bronchitis often means the beginning of the end; in the gouty, the rheumatic, the aged, the scrofulous, etc., often prolonged and recurrent trouble; in the young and vigorous, but a month's confinement to the house, to be followed by complete recovery.

Treatment.—In a disease of which the actual causation, the enemy to be removed, is often of such different character, it is impossible to speak of treatment but in general and guarded terms.

Above everything, the amateur physician must remember that, except in the grave cases when no medicinal treatment avails aught, bronchitis tends of its own accord to recovery, and that ill-judged and excessive medication only impedes this process.

The following measures are, however, *always* good:

In the first stage, keep the patient quiet and recumbent, to lessen the demands on his lungs.

Let him rest in an *even*, *warm* temperature (65° to 70° F.), in a fairly large and well-ventilated room, to lessen the irritable cough produced by the inhalation of cold air. The fire will act as an efficient aid to ventilation.

Nourish him with simple foods easy of digestion, avoiding at first solids, such as meat and fish, which might tax unduly his digestive apparatus. Let him have an abundance of warm fluids.

If the feeling of suffocation or pain behind the breast-bone be acute, apply, at frequent intervals, large, well-made, hot linseed poultices to the front and back of the chest, remembering, however, that even this simple measure is to be avoided in mild cases, for poultices are both debilitating and disagreeable.

If further treatment be desirable, the following inhalation may be used :

Oil of Hops	15 drops.
Light Carbonate of Magnesium	10 grains.
Glycerine, up to	3 ounces.

Mix. One teaspoonful of this admixture to be added to a quart of hot water (about 150° to 170° F.) and inhaled frequently.

A mild purgative (castor oil) may be taken in this stage.

In the second stage, expectoration will have commenced, and, while rest, quiet, warmth, etc., must still be secured, neither poultices nor the above inhalation will often be required.

Hot drinks of a mildly stimulating character, such as infusions of tea, coffee, cocoa, or coca, are often grateful to the patient and tend to facilitate expectoration. If, however, the latter remain scanty, chloride of ammonium may be inhaled from a special apparatus (the best I am acquainted with is made by Godfrey & Cooke, Chemists, of Conduit Street, London, W., who supply with it all directions for use), or that drug, a very harmless one in any case and a mild stimulant, may be used internally, thus :

Chloride of Ammonium . . .	1 drachm.
Liquid Extract of Liquorice . .	4 drachms.
Simple Syrup	1 ounce.
Water, up to	6 ounces.

Mix. One tablespoonful in a wineglassful of water every four hours.

Or three lozenges of chloride of ammonium (containing each 2 grains of the drug in black-currant paste) may be taken at the same intervals.*

The diet in this stage may be more liberal than in the first—no solids being, however, allowed—and may include often a little weak, hot, spiced wine (light port or claret) and water, or, in place of the latter, half a teaspoonful of spirits of sal volatile in a wineglassful of water occasionally.

In the third stage, the patient may, as a rule, be allowed to sit up and even move about the room, while at the same time a gradual return to a normal diet and a fair allowance of a good red Burgundy or of old port may be permitted. Little or no physic will be necessary unless the customary large doses of ipecacuan, squills, etc., have so deranged the stomach and stimulated the bronchial linings as now to call for an opiate as a corrective. If this has been the case, the following formula will be found both a suitable and agreeable one for adults :

Of compound tincture of lavender and ammoniated tincture of opium, each ½ oz.; of syrup of squills, caraway water, and glycerine, each 2 oz. Mix. Take one tablespoonful three times a day.

I repeat once more that, as regards treatment, the worst cases of bronchitis, those dependent upon some potent mischievous poison in the blood, are better without any medicine directed to the condition of the lung, every effort being directed to the eviction, if possible, from the body of such impurity, and to the maintenance of the general strength. In cases where chill has been great, and the

* It is difficult to understand how any apparatus more mischievous than the ordinary "Bronchitis kettle" could have been devised by man. It throws into the sick-room jets of vapor, which, condensing, soak the clothing, bedding, etc.

blood is, as far as can be judged, fairly pure, the ordinary expectorant drugs may be used, but are always better avoided, recovery being more rapid, and convalescence more satisfactory, without them. In the case of children, the most frequent sufferers of all, beyond poulticing, warm air, and suitable diet, the less in the way of medication that is attempted, the better for the infant.

(2) **Bronchitis, affecting the smaller bronchial tubes,** and often extending to the air-cells and real lung substance, hence its two names, **Capillary Bronchitis** and **Lobular Pneumonia.**

This derangement in its manner of onset, its course, its prognosis, and its victims, offers a strong contrast to the bronchitis which we have just discussed.

Capillary Bronchitis, to give it the more usual name, attacks almost exclusively the debilitated, especially at the extremes of life, being a common sequence of an attack of measles in a scrofulous child. It may also occur in youth and middle life in very delicate individuals.

It is *characterized* by but one, often a very prolonged, stage.

In a feeble aged person or a child that has never thriven —for such form nine tenths of the sufferers—a cough, *dry* and *frequent*, is noticed ; with this there is *loss of appetite and fever*, markedly *worse towards night*, the body at that time being often bathed in perspiration ; there accompanies these symptoms a *rapid falling off in flesh and strength. The breathing is quickened*, but there is no sense of suffocation, nor are there apparent, to the ordinary bystander, any of those loud, snoring, wheezing sounds so common in ordinary bronchitis. The expectoration is *usually scanty and sometimes blood-tinged.*

In the aged, death is almost a certain termination in this variety of bronchitis ; in infancy recovery occurs in per-

haps 50 per cent. of the cases, but convalescence is slow ; in youth and middle age recovery is more frequent, but there is always considerable danger that the disease may pass into the form of inflammatory consumption, the part of the lung affected with the bronchitis breaking down. This variety of consumption may, however, be recovered from, for, unlike the tubercular form of that disease, it is for a long time an almost purely localized condition.

The *treatment* of capillary bronchitis consists in the maintenance and preservation of the general strength. Poulticing is useless, and expectorant medicines are directly mischievous. The one risk is failure of the strength as shown by the termination in consumption or in death from exhaustion. Rest, in a warm, well-aired room, and judicious feeding, are the measures that alone can secure good results. If the cough, by its frequency, interfere with sleep, soothing inhalations are the safest means to allay it.

Pneumonia, or inflammation of the lungs (*lobular pneumonia*).—This disease, which, in its typical form, the one which we will first discuss, consists of three well-marked stages, exhibits, in its course, duration, and consequences, marked variations, depending upon the extent of the malady, the cause producing it, and the strength of the sufferer.

First Stage.—Sudden *shivering; marked fever; nausea; flushed face* (especially over cheek bones) ; *difficulty of breathing ; dry, hard, short cough,* often accompanied by *acute pain* in the side ; *rapid, full pulse ; dry skin; thirst;* and *great prostration* of strength. During this stage the part of the lung attacked, always a considerable area, is engorged with blood. This is, in fact, called "*the stage of engorgement.*"

Second Stage.—The urgent symptoms which marked the

first stage become even more pronounced, and delirium is frequently superadded. *Thick, tenacious, rusty-looking* expectoration, like prune-juice, is often seen.

In this stage the appearance of the lung closely resembles that of the liver. It is therefore known as the "*stage of red hepatization.*"

Third Stage.—This is marked by an amelioration in the symptoms. The breathing becomes *less short* and the expectoration *more easy and copious;* the feverish condition abates.

The lung in this stage, while still remaining solid, assumes a grayish hue, and is less firm and solid than in the last. This is known in pathology as "*the stage of gray hepatization.*"

Such is briefly the course of an attack of medium severity as seen in a vigorous person, and which is much less dangerous than the urgency of the symptoms would lead the layman to imagine. Still, even in this class of pneumonia, death may occur in the first two or three days from the *extent* of the disease, which may involve both lungs and thus render recovery impossible; or later on, from the formation of a large lung abscess, or from mortification of a portion of the lung, dangers which appear only towards the end of the third stage. The average duration of an attack of pneumonia is ten days.

In young children pneumonia is uncommon, while in women generally, and in the very delicate and aged of both sexes, though the three stages of consolidation and of red and gray hepatization are all present, yet the *external* symptoms are *very different* from those which mark such a typical case as I have described. The shortness of breath in them is rarely extreme, the fever is more moderate, and the disease is, *in appearance*, less formidable. In reality the opposite is the case, the disorder is more apt to end

fatally, or, if recovery does occur, the acute stages of the disorder are prolonged often for three or four weeks, while not very unfrequently the recovery is only partial, and *consumption* is left behind.

According to the best authorities, of fairly healthy men from fifteen to fifty years of age five sixths recover; of women of the same age, three fourths; of persons over fifty years of age and of both sexes, about one half; of the class we are now to discuss, not more than one fourth.

When the blood-stream is much polluted, as in Bright's disease, in diabetes, in drunkards, and in those stricken by malignant fevers, pneumonia may be set up by the smallest provocation, and constitutes then, as indeed one might expect, a very dangerous complication.

Treatment.—At first sight no disease would seem more urgently to demand treatment than pneumonia. Yet it must be, and in fact is, conceded, since the experiments made by Professor Hughes Bennett conclusively demonstrated the fact, that non-medication is more happy in its death-rate and general results than any system of drug treatment.

As in bronchitis, and in all *acute* lung affections, the patient *must economize* his breathing powers by absolute rest of mind and body, and must endeavor to soothe the irritated bronchial linings and favor the action of the skin by warm air. A purge may also be administered, and light fluids and easily digested foods should—sparingly in proportion as the fever is high—be administered. In the delicate and weakly, in whom the fever does not run so high, a more stimulating régime, including a fair proportion of sound wine, is to be commended. Poultices are absolutely powerless to mitigate the severity of the attack, but may be applied to mitigate severe pain.

Carbonate of ammonium, in the form of 20 drops of spirit of sal volatile, may be administered every three hours in a wineglassful of camphor water, and, in adults, 10 grains of Dover's powder may be given in gruel each night, the first to stimulate mildly the patient, the second to secure some rest to the nervous system, in sleep. Both drugs are, however, but in exceptional cases, best avoided.

Pneumonia sometimes prevails as an epidemic, and seems in such cases to be slightly contagious.

Pleurisy is the name given to a more or less extended inflammation of the lymph spaces, the pleural cavities, which surround the lungs.

It is *caused*, like pneumonia, by an unhealthy state of the blood, and especially of the lymphatic system, of which the pleura is an organ, though the attack is usually precipitated, finally determined, by a chill, arresting, in a greater or less area, the action of the skin.

It is a common accompaniment of pneumonia, the inflammatory process in the lung extending to the contiguous parts of the pleuræ, and is the cause of the pain which is so often felt in the former disease. An attack of ordinary severity is characterized by three distinct stages.

First stage, marked by *shivering*, fever, and *sharp pain* in the side (but sometimes referred to the abdomen) which renders *deep breathing impossible.* The pulse is raised, but is not so fast nor so full as in typical pneumonia, nor is there any marked flush on the cheek bones, nor any urgent sense of suffocation. There is a *dry, frequent cough.* This stage marks a congestion and swelling of the surfaces of the pleuræ and a slight gumming together of these.

Second stage.—The fever is higher, the pulse *more raised*, and the breathing *more shallow*, but *less painful.* The cough continues, and the patient finds it impossible to rest on the sound side on account of the weight of fluid poured

out on the affected side, which is often bulged out and motionless, or nearly so, when a breath is taken.

This is called the "*stage of effusion*," because fluid, usually thin and serous, but sometimes, in severe cases, bloody or purulent, is poured out into the pleural cavity, displacing, by floating upwards, the lung and sometimes also the heart, and rendering the lung thus squeezed almost useless.

Third stage, usually in its symptoms like the first one. The effused fluid is slowly reabsorbed by the pleural surfaces, the lung fills again with air, and the stitch-pain, more or less absent in the second stage, because the effusion kept the inflamed surfaces apart, reappears for a time, gradually passing away.

The duration of the attack is uncertain ; it rarely lasts less than three weeks, and assumes in all individuals attacked a very similar aspect.

Pleurisy varies much in severity. It is, as shown by the post-mortem examination of those who have never complained of pleurisy, but who bear marked traces of its ravages, an exceedingly common complaint, not unfrequently painless, and productive of few phenomena. Its danger is to be gauged by the extent of pleura affected and by the nature and rapidity of the disappearance of the effused fluid. If both pleuræ be affected, there may ensue, unless prompt measures be taken, suffocation from the grave interference with the lung functions, while if, as is frequent in the unhealthy, and especially in the scrofulous, the effusion be purulent, death may result from exhaustion or from perforation of the lung by the matter.

Pleurisy is an exceedingly common complication in Bright's disease and in impure states of the blood generally.

Its *treatment* is far more satisfactory than that of pneu-

monia, inasmuch as it is, when most necessary and of most avail, surgical in its nature.

Rest of mind and body are in pleurisy, as in all acute disorders, the first desiderata. The air of the bedroom should be warm (60° to 65° F.), but need not exceed the latter figure unless pneumonia or bronchitis be also present. Simple, light, and nourishing food may be given in fair amount, but no stimulant will be, at any rate in the first stage, called for. It is well to see that the bowels are kept regular, and, indeed, if the patient be robust, a purge may be given every day for the first few days.

Directly the pleurisy declares itself an effort should be made, by exciting an inflammation of the skin over the seat of disorder, to moderate the deeper inflammatory processes. For this purpose a mustard plaster, or, better still, free painting with blistering collodion will best avail. Directly this object has been attained, the irritated skin may be covered with vaseline and cotton-wool, and a firm pair of boneless stays, whatever the sex of the sufferer, should be applied. Tight-lacing is, in this one exceptional instance, not only permissible but advantageous, for it limits the movement of the lower part of the lungs — by far the most common seat of pleurisy—and thereby not only secures to the inflamed pleuræ rest, but serves also to considerably mitigate the pain.

As soon as the second stage, that of effusion, has set in, the one thing necessary is to note carefully the amount of the fluid—though none but the doctor can be trusted to ascertain this—and if it increases so as to compress seriously the lung or, as in some cases, both lungs, or if it displaces very considerably the heart, the chest must, without delay, be tapped. The operation is almost painless, and is speedily followed by immense relief. Many lives are lost by neglect of this simple measure. Again, in the

cases where the effusion is but moderate, tapping must be resorted to, if, at the end of ten days at the latest, the water does not diminish, for a lung too long compressed, even if the compression be not extreme, will never completely regain expansile power; and, moreover, a fluid, such as that exuded in pleurisy, will not always long remain without undergoing change, and when once pus is formed and what is called **Empyæma** is present, the chances of ultimate recovery are much reduced, and a more formidable operation than mere tapping, namely, free opening and drainage of the pleural cavity, becomes necessary.

If, as may happen, after all feverish symptoms have disappeared, a very small quantity of effused fluid remains, change of air to a mild climate and outdoor exercise are the means to be adopted for its removal.

The Degenerations of the Lungs.

Phthisis, or Consumption of the Lungs.—I have already been drawn into the discussion of this disease, but must again remind my readers that under this one term are included really totally different complaints. First and worst of all, we have **Tubercular Phthisis, or Galloping Consumption,** really a general disease, most prominent usually in its lung symptoms. In this variety there is really no hope of recovery, for the lung is attacked, as is the body in general, from ten thousand sides, and death will often supervene ere yet there be apparent, by auscultation of the lung, any absolutely certain signs of the presence of phthisis. *Great and rapid wasting* and *loss of strength*, with *complete absence of appetite*, and an *inability to assimilate* the lightest foods, mark the disorder, which often ends fatally in six weeks. Then we have **Inflammatory Phthisis,** at first but a local disorder due to pneumonia, or to capillary bronchitis of such severity as to lead to a localized destruction

of lung tissue. In inflammatory consumption, unless the neighboring blood-vessels and lymphatics absorb some of the broken-down material, and thus infect distant parts of the body, of which there is always danger, great hopes of ultimate recovery may be entertained. In these cases, *as in all chronic inflammatory mischief of every kind, attended by breaking down of tissues*, we shall have *chronic fever, worse at night*, and often *marked by profuse sweating;* and we shall also witness *debility, loss of flesh, absence of appetite*, and a great *lessening of assimilative power*. Of course we shall also have *cough*, and probably some *expectoration of blood*. The symptoms here, which are identical with those of slow necrosis of deep-seated bones, and with those of severe chronic abscess, need not excite grave alarm, provided the patient's strength is good and means are at hand to assist in its maintenance. Scores of cases of this order I have seen, when much emaciated, completely recover. A few modern surgeons have boldly, but very rationally, suggested that this variety of consumption should be treated on the lines of deep abscess, the diseased part being exposed and thoroughly cleansed; and indeed the only objection to be raised to this course is that so many cases get well without the adoption of any active interference, medical or surgical. Waiting, however, involves every day a risk that the system at large may become poisoned by the broken-down, bacilli-loaded tissues of the cavity.

Inflammatory Phthisis, even when fatal, may not kill its victim for many years.

The third variety of consumption is called **Fibroid Phthisis**, but is a totally different process from either of the last. It is a fibrosis of the lung, a swelling followed by a contraction of the fibrous binding material and a consequent slow strangulation of tissues. It is a rare disease, quite incurable, and may last for very many years.

Treatment of Consumption.—Of this little need be said. None is of the least avail in the *tubercular form.* In the *inflammatory variety,* the maintenance of the general strength and nutrition of the body are the great objects to be held in view; a sea voyage is often an excellent measure in the early stages, or a prolonged visit to an elevated region. Many cases get well under any or no treatment, and it is this variety that the quack consumption curer claims to save from death, and that he may, like any other man, easily cure, when he treats consumption at all; for the vast majority of his cases are not examples of this disease, but instances of simple anæmia, of chlorosis, of capillary bronchitis, etc.

For fibroid phthisis there is no special treatment that avails aught.

Of the other degenerative changes that may take place in the breathing apparatus, such as **Cancer of the Lung, Mortification of the Lung,** or **Simple Abscess of the Lung,** I shall not speak. They are all of them exceedingly rare diseases, to be diagnosed and treated only by a skilled physician.

Other Transient or Permanent Diseased Conditions of the Lungs.

Asthma is a *nervous* affection of the lungs, productive of spasmodic contractions of the bronchial tubes or congestion of their mucous linings.

It is *characterized by* the sudden advent, without fever, and often with a subnormal temperature, of *loud wheezings and whistlings* in the chest, accompanied by great *difficulty of breathing;* the sufferer being often *unable to lie down* and having a marked sense of *impending suffocation,* the *face becoming congested,* the *lips purple,* and the *eyes often staring and bloodshot.*

It is *chiefly caused* by irritation of the motor nerves which go to the circular muscular fibres of the bronchial tubes.

This irritation may be *direct* and the result of the in-breathing, in persons of specially sensitive nervous apparatus, of irritating substances. The pollen of certain flowering grasses will thus produce hay-asthma in some; in others, the fine dust in the air of a recently swept room, the smoke of a candle recently blown out, the emanations given off in a close stable, even the proximity of a fur rug, and a host of other apparently trivial causes may, in the specially predisposed, set the spasm of asthma in motion.

Most often the exciting cause is an *indirect*, a so-called *reflex* (reflected), one; thus a distant organ is the seat of some irritation, and is therefore constantly transmitting to the brain, by means of its afferent nerves, currents which in people of normal nervous system are reproduced as motor nerve force, travelling back only to the affected organ to set up therein some action whose direct effect it will be to assist recovery by expelling the cause of the disorder. But in people who have inherited, or have acquired, an over-sensitive nerve-tissue, the impression brought to the brain by the nerves from the irritated organ will often spread from the one nerve-centre to which it goes to contiguous ones, and as a result motor currents will be sent down to other organs. Thus epilepsy may be the result of the presence of tape-worm in the bowel, and violent hysterical convulsions, or the rigid muscular contractions known as catalepsy, may depend upon an inflamed or congested ovary or womb. Most often, however, the brain centre of the pneumogastric nerve, the motor nerve of the lung, is affected by this disseminated impression brought by an afferent nerve, and the result we witness in asthma.

The commonest seat, then, of the real cause of an asthmatic seizure may often be found in some organ in no way connected with the functions of respiration ; *the stomach* is, of all organs, most commonly thus at fault, next in frequency as a cause stand *the womb and ovaries*, and next comes *the intestine*. In children, however, the teeth are by far the most frequent seat of irritation, nine tenths of the so-called **Teething Bronchitis** of children being nothing but asthma.

Asthma results nearly always in recovery as far as the attack is concerned, but oft-repeated seizures lead at last to that chronic dilatation of the small air-vesicles of the lung which is known as **Pulmonary Emphysema,** while the strain thrown on the heart in its efforts to pump the blood through the lungs during the attacks ends in many cases at last in stretching—*i. e.*, dilatation—of the right side of that organ, and thus to enfeebled cardiac action, and eventually to a fatal issue.

Remarks.—Asthma is in reality a disorder of the nervous system, closely allied in nature to epilepsy, to hysteria, to catalepsy, and to spastic rigidity, and is only for the sake of convenience placed here among the lung affections. When asthma is seen, therefore, in a member of a neurotic family, the outlook is grave in proportion as the neurotic inheritance is great. As we might expect, gout poison in the blood very often, by producing acidity of the stomach, tends to the production of asthma. In the elderly or broken-down, asthma, however, is often seen as a mere sign of debility of the nervous system, and then attacks the patient in the early morning (2 to 6 A. M.), when the lowest point of nervous force in the twenty-four hours is reached. A little stimulant — *e. g.*, coffee, tea, coca, spirit of sal volatile, guarana, alcohol, or beef-tea, etc.—will often arrest these early-morning attacks, though

the sufferer will do well, by way of precaution, to keep the air of his bedroom warm during the night by means of a fire, and to avoid new blankets and feather beds.

In the first attacks of asthma suffocation is often dreaded. It cannot, however, owing to a very simple reason, occur, for, as the respiration becomes more and more impeded, carbonic acid collects more and more in the blood, until at last, by its anti-spasmodic action it arrests the spasm. In asthma we have, then, one of the clearest and most undeniable of examples of the beneficial action of an apparently totally mischievous symptom.

Treatment of Asthma.

(*a*) *Of the Asthmatic Seizure.*—The cause is to be sought and got rid of. If this be found in a direct irritant, such as dust, the patient must of course avoid a dust-laden atmosphere, or wear some simple inhaler, a woollen muffler will usually suffice, over the mouth and nose while exposed to it. If stomach disorder be present, or intestinal irritation be a suspected cause, a smart alkaline purge, such as the following, is a necessary measure :

Take of castor oil, ½ ounce; of bicarbonate of sodium, 20 grains ; of peppermint water, 2 ounces. Mix, shake well, and take at once. Or, in place thereof, a full dose of Gregory's powder, which may, if necessary, be repeated daily. If the womb or ovaries be at fault, means suited to their restoration to health must be adopted, while, for present succor, a purgative draught, such as that just mentioned, followed by 10-grain doses of bromide of potassium in a little syrup, every two hours, till eight or ten doses have been taken, will generally suffice.

Of empirical remedies and combinations, the following are very efficacious, in adults :

Nitrite of Amyl	5 drops.
Spirits of Ether	½ ounce.
Compound Tincture of Lavender	½ ounce.
Spirits of Chloroform	1 ounce.

Mix. A small teaspoonful in water every hour till the asthmatic spasm improves.

Iodide of Potassium	2 drachms.
Carbonate of Ammonium	1 drachm.
Camphor Water	3 ounces.

Mix. One teaspoonful in plain or peppermint water every two or three hours during the attack. To be continued thrice daily, for a few days, even after the disappearance of the asthma.

The last-named mixture, while singularly efficacious in all forms of asthma, even in hay-asthma, is practically harmless.

When asthma is complicated with bronchitis (bronchitic asthma), the following is an excellent formula for giving relief:

Carbonate of Ammonium	1 drachm.
Spirits of Ether	2 drachms.
Spirits of Chloroform	2 drachms.
Tincture of Lobelia	2 drachms.
Glycerine	1 ounce.
Compound Infusion of Orange Peel, up to	6 ounces.

Mix. Take a tablespoonful in water three or four times a day.

In cases of chronic asthma with debility, the following answers well:

Iodide of Potassium	3 drachms.
Spirits of Sal Volatile	1 ounce.
Tincture of Belladonna	1½ drachm.
Compound Tincture of Cinchona	2 ounces.
Caraway Water	1 ounce.

Mix. A dessert-spoonful in water thrice daily.

Inhalations are of great use. De Joy's cigarettes are well known; the smoking (and inhalation of the smoke) of dried stramonium leaves with a little light, dry Turkish tobacco, in a new clay pipe, is sometimes efficacious; the inhalation of the smoke of nitre paper (made by first steeping in a mixture of four ounces of nitre and a pint of water, a sheet of red blotting-paper, then drying, and finally burning it under a large cone of stiff paper, to the apex of which the patient applies the mouth), or of ozone paper, or of various herbal mixtures, or of pastilles containing stramonium leaves and seeds.

Superior to all of these for adults I have found the following:

Nitrite of Amyl	16 drops.
Chloroform	2 drachms.
Absolute Alcohol, to	1 ounce.

Mix. One teaspoonful to be sprinkled on cotton-wool, and inhaled when the asthmatic spasm is very severe.

I have dealt somewhat at length, and in opposition to my own opinion, on the medicinal treatment of the asthmatic spasm, and that because the complaint is a frequent one, for the relief of the distress arising from which most people are willing to face the after consequences and side consequences of drugs that will temporarily afford relief, and the use of which, in any case, need not be continued for long.

For my own part, I am convinced that in spasmodic asthma, *forced inspiration and forced expiration* are the best and certainly the most rational of measures for relief, though the method requires for success perseverance and fortitude. It is thus carried out: The patient *breathes out* all the air he can, and then closes firmly, and for *as long as he possibly can*, his mouth and nose, remembering that he cannot possibly suffocate himself thus. Then he

breathes in as much air as his lungs will hold, and again makes a determined effort to retain it for as long as possible. Then he expels it, and waits, without breathing, for as long as possible. If he repeat these three operations in this sequence—and they will gradually become easier of performance—in a quarter of an hour the asthma will generally have departed.

(*b*) *Of the Asthmatic Tendency.*

This consists in avoiding what is in each individual the special predisposing cause. If gout be suspected, use the remedies for gout; if stomach derangement, keep the stomach in good order; if intestinal irritation, watch carefully over the effects of special articles of food and guard against constipation, and so on.

Bronchiectasis.—A dilatation of some one or more of the bronchial tubes.

Caused by any prolonged strain on these structures, as by whooping-cough or chronic bronchitis; or by wasting of their walls.

Characterized by more or less *embarrassment of breathing*, *cough*, and *loss of general health*, proportionate to the extent of the disorder, and often by *great fœtor of the breath*, the result of decomposing mucus lying in the dilated bronchial tubes.

Resulting in the young and strong, if the dilatation be not great or extensive, in more or less complete recovery; in the aged and broken-down, contributing to a fatal issue.

Treatment.—Deodorizing inhalations and improvement of general health.

Collapse of Lung.—A condition which may be the result of pressure by a pleuritic effusion, of the blocking of a bronchial tube by inflammatory processes or by mucus, or of any growth (cancer, aneurism, etc.) within the chest.

Congestion of the Lungs.—A temporary or permanent condition of the lungs, consisting in their engorgement to a greater or less extent, and for a short or a long time, with blood.

Temporary Acute Congestion of the Lungs may mean one of the following things:

The commencement of pneumonia, or of capillary bronchitis.

The result of a sudden chilling of the skin.

Derangement of the heart's action, when it occurs as a complication in the course of other disorders.

Chronic Congestion of the Lungs means nearly always something permanently at fault in the left side of the heart, some obstruction to the outflow of blood from the lungs into the left ventricle.

Chronic congestion may, especially if aggravated, result in œdema or dropsy of the lung tissues. If it persists, a brown discoloration and hardening of the lung substance gradually takes place.

The symptoms of congestion, whether acute or chronic, are as follows: *Shortness of breath, especially on exertion; troublesome cough*, which may be dry, *frothy*, or *bloody*, according to the extent of the congestion; *turgidity of the face, blueness of the lips*, etc.

There is little or no feverishness, a distinguishing feature separating congestion at once sharply from all inflammatory disorders.

Hæmoptysis (*spitting of blood*) consists in a discharge of blood from the breathing apparatus. It is therefore only to be viewed as a symptom.

It may be a sign of the existence of any one of the following:

Congestion of the lung.
Inflammation of the lung.
Consumption.
Aneurism.
Rupture of lung.
Congestion or inflammation of the throat or larynx.
Bronchitis.
Arrested hemorrhage in other parts of the body.

Blood-spitting is not by any means the formidable symptom it is often thought to be. In only about one third of the total cases does it mean consumption, and in the vast majority of all others it is indicative only of a temporary congestion of the throat, larynx, or bronchial lining membranes.

The treatment will depend upon the cause.

Disorders of the Throat and Larynx.

Disorders of the Throat.—Just a word first on the structure, functions, and derangements of the tonsils. The tonsils are, in their main function, lymphatic glands, and therefore, as one might expect, often in a chronic state of swelling in scrofulous subjects. This variety of enlarged tonsils, which is first noticed often as early as the third year of life, forms one of the greatest troubles of scrofulous childhood, their swelled and unhealthy condition leading to frequent and severe sore throat, while their size and the irritation they set up interfere with sleep, producing loud snoring, and with the voice, which is rendered nasal in character. A blocking of the orifice of the Eustachian tubes often follows from this condition, and hence temporary attacks of deafness.

The only satisfactory treatment is to remove a small portion of the surface of each tonsil, and to treat the scrofulous taint on general grounds.

Scrofulous tonsils usually decrease in size after fifteen years of age.

The other great affection of the lymphatic system, rheumatism, does not often spare the tonsils. The swelling in these cases is, however, generally intermittent, and rarely troublesome in childhood and youth. This form of enlarged tonsil is not benefited by operation ; each attack of swelling should be treated on the lines of rheumatism.

There is yet a third variety of swelled tonsil, which gives rise to the disease known as **Quinsy.** I need scarcely inform the intelligent reader that an attack of this complaint shows always a pre-existing state of ill-health, and as he sees the tonsils "gathering" in the throat, the patient may feel thankful that glandular suppuration is taking place there, and not in the lung or in other deep, important structure. Quinsy is undoubtedly painful, but it is not dangerous, and its effects are as beneficial to the sufferer as an attack of acute gout is to the gouty man. It clears the atmosphere. Finally, all general disorders that fall hard on the lymphatic system naturally induce a swelling of the tonsils, and thus in syphilis and in scarlet fever it is exceedingly rare to find these structures spared.

The condition of the muscles and other tissues of the throat next demands a brief notice.

The **relaxed throat,** when the relaxation is in the throat and not, as is often the case, in the larynx and vocal chords, is merely an indication of a generally weak state of the whole body, and demands treatment as such. Unfortunately, there are many "lame ducks," whose structure is so defective that no measures avail to restore for long their general health, and such as these must spare the throat as much as possible if they would avoid relaxation, from overstrain, of that part. The **inflamed throat,** when the inflammation is not centred in the tonsils, means con-

gestion of the throat muscles, the result of a chill, or, very frequently, gastric disorder; while the **chronic inflamed or congested throat** means nearly always chronic gastric catarrh, in the majority of cases the result of alcoholic excess.

Finally, we have a superficial acute congestion of the mucous membrane of the throat, extending from the nose, and sometimes also affecting the eyes, causing them to water, and which is known as **Coryza, or Cold in the Head.** The cause is to be found sometimes in a chilling of the skin, sometimes in irritating particles floating in the air, and affecting those whose mucous membranes are especially sensitive. While, of course, during its continuance especial care in respect to great exposure should be taken, it is a mistake to treat this derangement with potent medicines, such as large doses of camphor. If any drug be commendable, it is, but in the case of adults only, a single 10-grain dose of Dover's powder in gruel, at bedtime, to be taken as soon as the first symptoms manifest themselves.

Diseases of the Larynx.—The larynx, or organ of voice, situated at the entrance to the lungs, might, at first sight, be thought to be a frequent seat of disease, which it certainly is not. Were the popular idea the correct one, that most of the affections of the lungs arise from damp or the breathing of night air, it is obvious that the delicate mechanism of the larynx would, perforce, share largely in all such consequences, when, as a matter of fact, congestion of the mucous membrane of the larynx, in comparison with congestion of the mucous membrane of the lung, stands in the ratio of but 1 to 10, while the comparative frequency of inflammatory processes in the two structures are, perhaps, as but 1 to 100.

Why this great immunity of the larynx, as contrasted with the lung, from disease? The answer is comparatively

simple : the larynx does not share in the purification of the blood, and is therefore not so liable to derangement from poisons circulating in the blood-stream.

Congestion of the laryngeal mucous membrane occurs as a transient condition whenever "a cold in the head" passes down to the bronchial tubes to become "a cold on the chest." It is productive of hoarseness while it lasts, and gives the cough a muffled sound. In public speakers and singers overstraining of the organ of voice leads sometimes to a similar state of matters, or again, in place thereof, to a sort of atony, or partial paralysis from exhaustion, of the vocal chords and muscles. This is often spoken of as *a relaxed sore throat*, which of course it is not. For the delicate it is a good practice to take a cup of beef tea, or of strong coffee, or a glass of dry sherry and a raw egg, or a dose of coca wine, just before the time of performance, to obviate a breakdown. In would-be public speakers a course of elocution from some one acquainted with the structure, functions, and limits of power of the human larynx is advisable, as upon faults in the *method* of speaking depend the majority of the cases of breakdown, such as "clergyman's throat."

Inflammation of the larynx, or Laryngitis, is, even in adults, a rather formidable complaint, and in children is attended with considerable risk to life.

It is caused, in the otherwise healthy, only by excessive exposure to cold or dust-laden air ; in the subjects of any form of blood-poisoning it originates on the least provocation, or even without any apparent predisposing cause; it is common therefore in drunkards, in sufferers from Bright's disease, and in severe fevers, especially in typhus. In measles the rash may first of all be located in the throat and larynx, and transient, severe laryngitis, having all the symptoms, but few of the dangers, of croup, may

precede by a day or two the appearance of the rash on the body.

The *symptoms* of laryngitis are often severe. There is *fever*, considerable *difficulty in breathing*, a *squeaking sound* being noticed on inspiration and a *whistling* one on expiration in bad cases, *loss of voice* or great thickness of speech, a *tickling cough*, and sometimes *local pain*. In children the symptoms are even more severe, and the disease is marked by occasional *paroxysms of extreme difficulty of breathing*, the result of spasm of the larynx set up by the inflammatory mischief. Laryngitis is known in children as **Croup** (*i. e.*, *non-membranous croup*, as distinct from membranous or diphtheritic croup, which latter is really diphtheria of the larynx), and on account of the narrowness of the air-passages, and their extreme sensitiveness in early life, it assumes always in them a much more formidable appearance than in adults.

The treatment of laryngitis consists of absolute rest in a warm room, the temperature of which must be kept uniform ; in soothing inhalations of the vapor of plain or of medicated water, and in simple feeding.

So grave a disease as is croup in children justifies the most heroic measures for its relief. On the first sign of it, one of two almost equally good courses should be adopted : either the larynx should be surrounded with a cold-water lead-coil,* which may be bent to shape, and through which cold water must be allowed to run without intermission for forty-eight hours ; or enveloped in small hot linseed-meal poultices, which must be kept constantly *in situ* and frequently changed.

If, in spite of such measures, the disease advances, tracheotomy, a fairly easy and very hopeful operation in

* These lead-coils are made by Kröhne & Sesemann, of Duke Street, Manchester Square, London, W.

simple croup, but little more than a palliative of the sufferings in diphtheritic croup, should, without delay, be resorted to.

Spasm of the Larynx, False Croup, or Child-crowing, is one of the commonest disorders of early infancy. It is a reflex spasm, as is usually that of asthma, and may be produced by indigestion, by teething, by the presence of intestinal worms, etc. It is rare after six years of age.

Symptoms.—The child, who is fairly well, wakes up (for the attacks are more common during sleep and at night) with a start, sits up in bed and makes violent efforts to breathe, the air entering the chest with great difficulty, and the acts of breathing producing a peculiar croupy, crowing sound. Often the *face gets livid*, and the *eyes staring;* the child *grasping the throat* as if to rid itself of something there.

All at once, when the attack is at its worst, the *symptoms rapidly subside*, and often, in a few minutes, the child falls off again to sleep, perhaps to awake with a similar attack in a few hours.

As in asthma, so in spasm of the larynx, the risk of suffocation is really very small, and for a similar reason. When once, as a result of the interference with the breathing, carbonic acid has accumulated to any great extent in the arterial blood, it arrests all spasm and therefore cuts short the attack when at its worst. For this reason, spasm of the larynx in infancy is only rarely fatal.

The larynx, like other parts of the body, may be the seat of cancerous degeneration or of the degenerations characteristic of tertiary syphilis.

The larynx, like the nose, is not unfrequently the site of a polypus, the early removal of which, a simple operation, is always advisable.

We have now completed what, after all, is but a cursory glance at the *one* and *only* real and independent system in man, the food system, that in the work of which every cell in the human body is concerned.

We will now turn to the three subsidiary systems, offshoots, with some specialized functions not purely alimentative, of the great system we have discussed. First, we shall discuss the great controlling or co-ordinating mechanism, *the nervous system*, that on the proper working of which depends the life and action of man viewed as a country, as a compound unit, if such a paradox be permissible, the sum of all the individual cell actions. Then we shall pass to a very brief review of *the motor system*, which, but a branch of the great food system, is worked by the nervous system with a view mainly to the maintenance, not, as in the food system, of balance between one part of the body and another, but of a due state of balance between the whole body and its general surroundings. Finally, we shall be compelled briefly to notice *the reproductive system*, which, while a dependent on the food system for its powers, is, in its functions, more of a supplemental system, belonging less to the individual than to the species.

In the study of all the systems we shall see that a knowledge of their uses, of their limits of power, of their interdependence, and of their relationship to the entire body in its action as one individual, are all necessary to us if we would avoid disorder and disease, which are ever the justly apportioned and certain consequences of misuse.

No. 2.—The Nervous System.

CHAPTER XVI.

FUNCTIONAL NERVE DISORDERS.

THE NERVOUS SYSTEM.

Its Functions.—Its Functional Derangements.

(*a*) *Due to Nervous Strain at certain times of life:*
Hypochondriasis, Hysteria, Mental Depression, Temporary Insanity, etc.

(*b*) *Due to Impurities in the Blood:*
Depression of Spirits, Irritability, Sleeplessness, Neuralgia, Hallucinations, etc.

(*c*) *Due to Misuse (Overwork, etc.) of the Nervous System:*
Writer's Cramp, Delirium Tremens, Chorea (?), Neuralgia, Migraine, Spinal Irritation, Local Palsies.

(*d*) *Due to Reflex Causes:*
Infantile Convulsions, Hysteric and Hystero-epileptic Fits, Epilepsy (functional variety), Catalepsy, Tetany, Functional Paralysis.

The Nervous System.

CHAPTER XVI.

FUNCTIONAL NERVE DISORDERS.

Firstly, we will discuss very briefly the *plan* of the human nervous system, and by the light of that we will trace causation and consequence in the phenomena attendant on its disorder.

Plan of the Nervous System.

Essentially, the nervous system consists of nerve-cells grouped into nerve centres, and of nerves.

Each nerve cell is a species of galvanic cell, and its function is to generate a variety of electrical force called nerve force.

Each nerve cell has a nerve going to it (the afferent nerve), and conveying to it an *impression* received in a portion of the body, and also a nerve going from it (the efferent nerve), which carries the motor force emitted from the nerve cell as a result of said impression.

Each nerve cell has also a second outlet for motor force —namely, a nerve by which it is in direct or indirect connection with the brain. In most nerve cells, unless the impression received has been excessive, no current passes by this second channel of outlet.

Let us pause for a simple example. Ordinary food in the intestine excites to ordinary intestinal movements of which we are quite unconscious; but let us take a dose of colocynth, and at once the stimulus to the bowel wall has become unusual, and not only is excessive movement of the irritated portion of the bowel induced, but the brain is apprised of the fact by the second channel of exit, and we become conscious, painfully so, of the presence and action of an intestinal irritant, and as this impression going to the brain represents a force of some kind and cannot therefore be annihilated, it is reproduced from other centres* there as motor force, and thus other muscles, such as those of the abdominal wall, come to our relief and assist in expelling the colocynth.

Nerve centres of this kind—automatic, or, as they are called, *reflex*, because under ordinary circumstances they *reflect* as it were the impressions they receive — are arranged either singly or in groups in the tissues, and especially in the spinal cord, which indeed is an admixture of columns of nerves going to and from the brain and of these reflex centres.

The brain is a vast collection of such nerve centres, but of nerve centres in two stages of evolution, which may here, for the sake of simplicity, be spoken of as the lower brain and the higher brain (usually styled lower and higher brain-centres); the former of these is common to the higher mammals, the latter is, at least in its most perfect state of development, seen only in man; indeed, it is the possession of this higher brain-centre, this higher brain, which is *the* distinguishing anatomical feature of humanity.

Now, the lower brain consists essentially of a vast group of ordinary nerve centres, packed closely together and

* The group of nerve cells in connection with all the nerves of any organ is called the *nerve centre* of that organ.

united to one another by nerve fibrils; therefore, while each centre retains individuality as it were, inasmuch as it reigns over and regulates a certain part of the body, just as do the ordinary reflex nerve centres in the trunk, of which I have already spoken, yet to a certain extent the whole lot act together, sharing as it were in each impression received by each member; and this dispersion, so to speak, of each impression is called consciousness, a phenomenon common to man and the higher animals.

The higher brain, at least in its fullest development, is the property exclusively of man, and consists of a vast assortment of specialized nerve centres, to which some part of the impressions received by the lower brain are imparted, and where they are, so to speak, "worked up" into reason and the higher mental functions generally.

But while all psychologists go thus far, no one has yet been able to explain, or indeed to conceive, how the mere chemical action of food in the blood-stream on nerve cells can result in those great functions of the brain collectively called mind. Nor, to my mind, is it likely that a satisfactory solution will ever be forthcoming, since it seems hopeless to expect that a group of brain functions — in other words, the mind—can form an adequate picture of itself.

Fortunately this psychological *cul-de-sac* will not impede our study, nor need we run our heads against its dead wall; it suffices for our purpose simply to know that the higher brain has, as its function, the higher mind, reason.

The only source of all cell-force, and therefore of all nerve-force, is the food in the blood-stream.

Functional Derangements of the Nervous System.

The functions of the nervous system, or of any part of it, may be temporarily suspended, to a greater or a less ex-

tent by the operation of various causes. The food supply may, for example, be deficient or impure, and in this we have perhaps the most frequent cause; the nerve tissue may be exhausted from overwork, or a weak nervous system may be for a short space invalided even by what may be viewed as ordinary labor; and, lastly, a disorder in some portion of the body may lead to the transmission of such powerful, such oft-repeated, impressions upon any one nerve centre, or any group of nerve centres, as to throw out of gear—especially if the nerve tissue be debilitated by want of food or be weakly by inheritance—brain tissue, far and wide.

We all know the distressing vertigo, the attacks of syncope, the short losses of consciousness, from which anæmic girls or delicate ladies in hot rooms so often suffer. In these we have examples of the effects of a temporary deficiency of blood—*i. e.*, of nerve food—in the brain, and a consequent impairment of its functions. We know, or have heard of, the frequency of delirium in fever. This does not arise, as was at one time supposed, from inflammation of the brain, but from the circulation of impure blood in that organ, and is a mere derangement of function. We know the incapacity for further mentalization which ensues on excessive brain-work, and which is the evident result of brain exhaustion; while, as examples of the disordering effect ensuing, especially in the neurotic, in the brain, from constant disorder in a distant part of the body, we may cite the hysterical convulsions, the teething fits of children, the epileptiform seizures which sometimes depend on the presence of tape-worm in the bowel, and the muscular twitchings which are the not uncommon dependents on the presence of a calculus in the kidney.

Finally we view, as further and distressing instances of functional nerve disorder, the great depression of spirits

seen in the gouty and the bilious, the direct consequence of the circulation of impurities in the blood; the extreme melancholy and distortion of the judgment witnessed in the hypochondriacal, often the result of the same cause, and the loss of mental balance, the result of the insufficiency of the blood supply to meet the extraordinary demands made by the body, which often marks the early stages of puberty.

After these prefatory remarks, let us pass to a closer inspection of some of the more common and most distressing symptoms consequent on functional nerve disorder; and here again, as hitherto, I shall work up from cause to effect rather than adopt the ordinary method of giving a name, such as hysteria, to an indefinite group of symptoms, which are not, any of them, the exclusive property of that derangement, and then endeavoring to trace their causation.

(*a*) Functional Nerve Disorders due to Nervous Strain at certain times of life.

An impoverished state of the blood does not, as we have seen, in itself lead, unless the nervous system be already in an exceedingly enfeebled state, to any symptom of mental disorder; on the contrary, provided the subject remains quiet, the mind seems to grow clearer as the other bodily organs, owing to their slow starvation, approach more and more nearly to complete arrest of function. Thus in death from hemorrhage, from the slow sapping of life by inflammatory phthisis, or by chronic necrosis of bone, and from advanced simple anæmia, the head remains almost to the last moment clear, and the mind unclouded, while a sense of hope and of elation is not by any means uncommonly present, even after the patient has been informed that all chance of recovery has disappeared. I

have remarked, moreover, repeatedly, that when a person —owing often to the too-sudden adoption of an insufficient and exclusively vegetarian régime — is losing flesh and muscular power at what is obviously a rapid rate, he almost invariably fails to recognize any danger because of this state of mental calm, the mind becoming, as he would well express it, more refined and less gross. I have always regarded, in these cases, such a state of the intellect as one of ill omen, and have known more than one individual who refused to take warning by it pass away rapidly by consumption.

It is only when at certain periods of life the blood is unable to meet the call for an extra supply of nerve-food that nerve disorder is witnessed, and even then mainly in those whose nervous system, by misuse or by inherited weakness, is below the normal strength.

The following are some of the stages or states in life in which these sudden calls, that test so crucially an individual's nervous capacity, occur :

Puberty, enforced and unwilling celibacy, parturition, lactation, and the *change of life.*

It will be remarked that, with the exception of the first, common to both sexes, the rest are conditions almost exclusively of female life, and thus at a glance we can understand why, apart from the operation of other causes, functional nerve disorder is of such exceedingly common occurrence in women.

In the male puberty is often marked by **Hypochondriasis** and extreme **mental depression,** sometimes by actual mental disorder. The hypochondriacal fears are usually of a sexual character, but may take the form of a vague dread of some disease, such as cancer or consumption. It is needless to say that the quack — qualified or *sine diplomâ* — has "marked down" this form of hypochon-

driac for his special prey and rarely fails to bag many of the species.

In woman, in whom, as in all female mammals, the sexual passion is—*tacite*, O romancers of the "natural school"—normally, as compared with that of the male, weak, the nerve failures of puberty take the form of depression, not unfrequently tinged strongly with religious ideas, and but very rarely with those of a sexual nature.

Enforced and unwilling continence tells strongly and powerfully on the female sex, to which it is so largely confined; not, as some who judge of womankind in general by certain depraved or morbid specimens thereof would have us to believe, because of the suppression of strong sexual passions, but by the denial to such women of the instinctive wishes of maternity, of the satisfaction of a natural craving of the feminine nature for close affection and for admiration, and of many aspirations only to be satisfied in the married state. This incessant mental strain, this worrying of the nervous mechanism, aggravated at regular periods, in conjunction with a lack of sufficiently engrossing employment and of that muscular exercise so necessary to appetite and digestion and to the due replenishing of the blood-stream, directly produce the neurotic and the hysterical woman. The system of treatment adopted often greatly aggravates the malady. The constant, mischievous, and absolutely unnecessary manipulation, cauterization, etc., of the womb, and the administration of all those mental poisons and paralyzers, bromide of potassium, morphina, Indian hemp, spirits of chloroform, chloral, etc., etc., both tend to lengthen the attacks of hysteria and to convert what at first was but a simple and curable nerve derangement into an intractable morbid mental condition. The man who suggested in massage the rational treatment by passive muscular exercise, by

enforced feeding, and by excluding all evil advisers and unwise sympathizers, deserves well of his race, and, though his system has been discredited by frequent mis-usage, he will, I venture to think, in future ages stand out as a giant among the puny and short-sighted medical scientists of his time.

The risks of mental disturbance attendant on the calls made on the body by parturition, and by the great drain on the blood-stream involved in suckling the infant, are well known. Like all functional nerve disorders due to the want of balance between bodily demand and food supply, they tend, on the return of equilibrium between these two, to spontaneous recovery.

The period that marks the close of sexual life in women is one very subject, in many cases, to perturbations of the nervous system, which may take different forms. In the majority of cases, *depression of spirits* and *great and unreasonable irritability* are the sole external evidences of this, but occasionally *alcoholic or erotic tendencies* are at that period developed.

In addition to these states of body cited as predisposing, in conjunction often with improper feeding and heredity, to nervous functional disorder, others, such as those that succeed to periods of great excitement and worry during which little food has been taken or assimilated, might be added.

What is, then, the prognosis in the class of cases here mentioned?

In proportion as the nervous system is, by inheritance, sound, and rational means of treatment are adopted, the outlook in nerve failure is hopeful. Chronic hysteria and chronic hypochondriasis may in such instances be undoubtedly cured. The causes at work must first be carefully and diligently sought for, for they do not always lie

on the surface. Many of these, always morbidly sensitive, sufferers harbor grievances and animosities with which, in their abundant spare time, they, as it were, scourge themselves, while with some there exist, unsuspected, actual delusions, or strangely distorted views of life and of persons.

The treatment consists in seeking for, and as far as possible removing, the cause; in inducing, if possible, the sufferer to "rub shoulders" again with the world at large; in throwing new and wholesome interest into her life, and in diligently persevering in every means that can improve the general physical health. Beware of the folly of attempting to ridicule away the symptoms. After removing the cause of the nervous disorder, the cure may be completed by mental medicine. In the case of the hypochondriac a serious weighing of all the symptoms and a demonstration to him that they are inadequate to account for the serious disease dreaded, an explanation of his fears, and a judicious dwelling on the certainty of recovery, will generally afford great and prolonged relief; while, if there be any disorder present, as there sometimes is, this must receive attention and be put to rights. In old-standing hysteria the ministering successfully to the mind diseased is often much more difficult, for the patient lives usually in an evil atmosphere of misplaced sympathy, and among those who have already expressed belief in her fanciful—or slight, but exaggerated—disorders. One fact all people should be thoroughly acquainted with—namely, that "the presence of hysteria is incompatible with grave disease." To this rule there are but very few exceptions. The same is true equally of hypochondriasis. Indeed, it has often struck me as extraordinary with what coolness or apathy this class of sufferers will face real physical infirmity when attacked by it. Probably the weakening and deadening which the nervous tissue, in common with

all other tissues, then undergoes, is at the root of this disappearance of both hysteria and hypochondriasis in the face of organic disorder.

Mistreated hysteria and hypochondriasis, especially when severe, or occurring in individuals predisposed to mental aberration, may, however, end in insanity.

(*b*) Functional Nerve Disorders due to the circulation in the Blood of Impurities.

In latent gout and rheumatism, as in latent biliousness, and in many states of mal-digestion, where imperfectly prepared food materials, or the actual products of decomposition, find an entrance into the blood, nervous disturbances are among the most troublesome and the least understood of the symptoms observed.

Most of my readers know, either by experience or by repute, that periods marked by *neuralgia*, by *great depression* and *irritability*, by *sleeplessness*, and sometimes by *slight mental hallucination*, frequently precede and are completely cured by an attack of acute gout or acute biliousness ; but they do not so readily recognize that there exist individuals in abundance whose tissues cannot, so to speak, be worked up to such health-restoring revolutions. These, at certain periods of life, when the health has from any cause become a little lowered, as from living on a damp soil, or from worry or an irregular system of food-taking, suffer for prolonged periods from extreme mental depression, which gets after a time a little better, only again to reappear as a sequence of any conditions adverse to the bodily health. Such people, imagining themselves hopelessly ill, and feeling life a burden too great to bear, not unfrequently end their days by their own hand, when, if they had but known that at the bottom of the whole trouble there lay but gout poison, bile acids, or imperfect

products of digestion, which, never absent from the blood-stream, worried and fretted their nervous mechanism, they might have possessed courage to face the enemy. Certainly more than 90 per cent. of all the cases of depression seen in people under fifty years of age, and who may be therefore assumed to possess nerve tissue not as yet degenerated, admit of a very simple explanation of the above order, and are but functional nerve derangements due to impurities in the food supply of the system.

There is a characteristic distinction by which we may rarely fail to make, independently of the question of age, a true diagnosis between depression of spirits, the result of functional disorder, and the same symptom as a sign of threatening permanent melancholia, having its end in dementia. The subject of the former is anxious to be treated and is communicative ; the depression causes him much thought, and he usually has a constant dread of insanity. The subject of commencing dementia, while evidently passing through a period of prolonged gloom, sitting alone moody and silent for hours, rarely courts medical advice of his own free-will and is never communicative. In the majority of cases such a one will simply tell the doctor that he is " all right," and that he has no symptoms that worry him or that he can discuss. The apathy in him forms a striking contrast to the animation of manner and the interest in treatment shown by the subject of mere hypochondriasis. The latter, moreover, has no other symptoms, and indeed his friends are usually quite unaware of his mental sufferings, while the former is usually slovenly, obviously miserable and ill, and sometimes given to violent fits of passion.

In all disease of the body it may be held, as a safe general rule, that the greater the anxiety of the patient the less his danger, and this is most strikingly exemplified in the derangements of the nervous system.

The prognosis in all cases of mental depression, etc., the consequence of functional inactivity of the liver or of the other digestive organs, producing impurity in the blood, is hopeful, however advanced the life of the patient.

The treatment must of course be directed, in the first instance, to the removal of the cause. The subject of latent gout or biliousness should visit some mineral spa, while the sufferer from dyspepsia will usually do well to take a turn at mountain-climbing or to go salmon-fishing. He must live on simple food, and he must earn it by his daily exertions.

Relief from *extreme* depression may, however, in nearly all of these cases be secured by means of a drug, and this is especially the case if gout be a factor in its production. In such cases it is often wise to order :

Iodide of Potassium	1 drachm.
Aromatic Spirits of Ammonia .	3 drachms.
Elixir of Peruvian Bark . . .	1 ounce.

Mix. Take one small teaspoonful in half a pint of water on an empty stomach thrice daily.

If the cause be chronic biliousness, I prefer :

Iodide of Potassium	1 drachm.
Chloride of Ammonium . . .	2 drachms.
Elixir of Peruvian Bark . . .	1 ounce.

Mix. Same dose and manner of taking it as above.

If, however, the depression is not traceable to either of the foregoing causes, the following will generally give relief :

Bromide of Potassium . . .	1 drachm.
Tincture of Nux Vomica . .	1 drachm.
Caraway Water	6 ounces.

Mix. Dose—One tablespoonful in water thrice daily.

It is a remarkable fact that, while iodide of potassium and bromide of potassium are among the most depress-

ing of known drugs when given in other illnesses, in states of depression their effect is usually of an opposite nature.

Among other functional nerve disorders due to the presence in the blood of impurities, may be classed whooping-cough and tetanus, which have been placed and already referred to, for the sake of convenience, in another section ; while according to some authorities, **Chorea,** better known as **St. Vitus's Dance,** ought to come under this heading, being in their view generally the product of rheumatic poison in the blood-stream.

(*c*) **Functional Nerve Disorders due to a local or general transient debility of the Nervous System, the result of overwork or other misuse.**

Writer's Cramp, or *Scrivener's Palsy*, is a want of co-ordinating power in muscles that have been long accustomed to work together so as to fulfil one function. It is not confined to those who work with the pen, but may attack any handicraftsman as a result of overwork.

The attack commences insidiously, with a mere *stiffness* after a long day's work, and advances till writing or other accustomed labor with the hand becomes an *impossibility*, each muscle appearing to act independently of the others ; the concerted action of the muscles necessary to the usual work being thus destroyed.

Strange to say, writer's cramp does not incapacitate the hand, as a rule, from use at other manual employment.

The treatment consists in giving the hand complete and prolonged rest from the work at which it has broken down. If cramp appears in one accustomed to get his living by the pen, such a means of livelihood had better at once be discontinued, for, even if prolonged rest restores

the capacity to write, there will always be a risk of relapse. An alternative plan that I sometimes recommend is to learn writing with the other hand.

Alcoholic Intoxication and Delirium Tremens.—In the first of these we have a temporary disarrangement of the nervous system, the consequence of an alcoholic stimulant; in the second, a more prolonged and more severe functional disorder—a species of brief insanity—the result of oft-repeated indulgence in nerve stimulants.

Chorea, or St. Vitus's Dance.—This functional disorder, while occasionally connected with the rheumatic constitution, is commonly the sequence of a sudden fright in a child, the offspring of neurotic parents. It is most common between seven and twelve years of age, but may occur in adult life, in which latter case it has often a grave significance. It is most frequent in the female sex.

The symptoms of it are briefly as follows: There are *twitchings in the muscles* of the face and of the extremities, which are usually most marked on, and sometimes exclusively confined to, *one side* of the body. In bad cases the head is never steady, and the child is *unable to grasp* anything or to *walk steadily*. The twitchings *cease during sleep*.

There is rarely any fever, loss of appetite, or derangement of the general health. In childhood and youth the disorder ends almost invariably in recovery.

Treatment.—The general health should be improved, and the child should undergo, by itself, a regular course of drill. It should not associate much with other children, as they, by imitating the choreic movements, sometimes themselves acquire the disorder.

Neuralgia.—A functional nerve disorder (usually), characterized by severe pain in one or more nerves. Caused by debility from illness or overwork, by anæmia, and by

the circulation in the blood of poisons (notably of gout poison), and by pressure on, or disease of, the nerve or its sheath.

Treatment.—In inveterate cases cut down on, and stretch the nerve. In other forms search for blood poison, especially gout and syphilis, or for any of the other causes mentioned, and treat accordingly. The paroxysm demands relief, and the following are among the more successful of the various empirical remedies :

Electricity.—The constant current along the course of the nerve, administered from a Leclanché battery, is often effectual.

Quinine.—5, 10, or 15 grains in a single dose, which may be repeated if necessary in two hours.

Morphina under the skin, for adults.

Chloral.—15 to 30 grains in syrup of ginger, for adults.

Butyl-chloral hydrate is often a satisfactory, and, for adults a safe, sedative in severe neuralgia, and may be thus ordered : Butyl-chloral, 20 gr.; syrup of Tolu and almond mixture, of each 1 oz. Mix. Dose—A fourth part every hour till pain ceases.

Of *external applications* the following is, in my experience, the best :

Camphor, chloral, thymol, and menthol, of each ½ drachm. To be ground in a mortar till a fluid is formed. The liniment to be painted over the seat of neuralgia.

Migraine or Hemicrania.—A disorder usually confined to *one half of the head*, and marked, on that side, by *dimness of vision* and great discomfort. The attack is attended often by nausea and vomiting (which brings relief), by *giddiness*, and sometimes by *facial neuralgia.*

The attack is usually the result of worry, fatigue, overwork, or other depressing cause, acting on an individual of nervous or gouty or bilious constitution.

Results in recovery.

Treatment.—Excite sickness by draughts of warm water. Afterwards administer a mild purge. If the attack resists these measures, infuse 30 grains of powdered guarana in a teacupful of boiling water and sip the mixture as hot as possible.

If these measures fail, try butyl-chloral hydrate, as for neuralgia.

Spinal Irritation.—A symptom resulting from worry and overwork acting on a person of nervous, and especially of hysterical, temperament.

Characterized by the occurrence of neuralgic pains in the trunk, most often between the ribs, and especially *by spots of numbness or of excessive tenderness* in various regions of the trunk and *particularly over the spine.* Sometimes attended by hysterical paralysis.

Results in recovery.

Treatment.—That for hysteria.

Local and Temporary Palsies.—Paralysis of motion or of sensation in almost any part of the body may be witnessed as the result of worry or excessive fatigue in those of neurotic constitution. When associated clearly and evidently with hysteria, no importance need be attached to the symptoms, and measures for the general relief of the hysterical should alone be adopted. If local measures be necessary, electricity, in the form of the constant or of the ordinary interrupted current, is the agent most likely to be of avail.

(*d*) Functional Nerve Disorders due to Reflex Causes.

The most formidable of the functional disorders to which the nervous system is subject are traceable to reflex causes.

We have already, in the earlier part of this chapter,

seen by what mechanism this may be brought about. Let us now briefly recapitulate.

The functions of animal life are carried on by automatic —*i. e.*, simple reflex—acts. The stimulus of food in the stomach goes to a nerve centre that sends back the power whereby the gastric movements are performed and the necessary secretion of gastric juice is provided. The same sequence of affairs occurs in the intestine, liver, etc.

But if the impression on the stomach, intestine, etc., be stronger than (or, perhaps more correctly, different from) the usual one, such as, let us say, may be produced by some indigestible ingredient in the food, then the impression set up by such will travel beyond the ordinary nerve centre, and be, in part, transmitted to the brain, and we shall become painfully conscious of exaggerated intestinal movements, while the abdominal muscles are also set in motion and assist in the expulsion of the intruder, the indigestible morsel.

If such impression be not only occasionally but *constantly* abnormally strong—in other words, if, instead of a morsel of undigested food, a tape-worm be located in the intestine—the incessant and abnormal stimulus sent to the centre in the lower brain which is in direct nerve communication with the intestine may very easily extend in time beyond that, its proper area, and irritate contiguous centres, and end by setting up violent and general muscular movements—the twitchings we see in some, the asthmatic spasms we note in others, the violent epileptic seizures in the worst class of cases. Of course, if, by heredity, the nervous tissue generally be weak or faulty, a proportionately slight stimulus will induce an equal result.

But while the reader can readily understand the *rationale* of the process by which a troublesome tooth in the

infant gum, an inflamed ovary or womb in a delicate female, a stone in the kidney, gouty acid in the stomach, or a tape-worm in the bowel of man, may set up such erratic muscular movements as are noticed in asthma and in infantile, hysterical, or epileptic convulsions, he may fail to comprehend why, the irritation being constant and slight, the resulting convulsive spasms should be periodic and violent. Nor is any satisfactory answer to this riddle as yet forthcoming. True, our great authorities speak of the brain cells hoarding up the stimuli received and then suddenly and explosively emitting them, much in the same way as a choleric man may allow in silence aggravation to accumulate until at last he feels that he can contain his passion no longer and gives free vent to his feelings; but, unfortunately, these similes are of no scientific value whatever, being unsupported by facts of any real weight.

Let us now treat briefly, in detail, of these reflex motor phenomena.

Convulsive Seizures.

Infantile Convulsions.—Convulsions are, as all the world knows, of frequent occurrence in infancy. The tendency to them is at that period of life, owing to the extreme sensitiveness to impressions of the infantile nervous system, very great, and what in the adult would be considered trivial causes, suffice to set them in action.

In character they are typical examples of functional epileptic seizures. Teething, indigestion, and the presence of intestinal worms are the more frequent causes.

By way of explanation I must here remark that convulsions, not epileptic in character, and the result of impurities circulating in the blood, or of some interference with the aëration of the blood in the lung, occur also frequently in infancy. Such are common at the commencement and in the course of the severer fevers, in whooping-cough,

and in severe bronchitis. This variety of fit is nearly always *of ill omen*, while those of a purely epileptic and reflex nature are rarely indicative of any great danger.

The treatment of the convulsive seizure in a child is simple. The infant should be placed in a warm bath, into which mustard (a teaspoonful to each quart of hot water will generally suffice) has been thrown, and should be kept therein till the skin is thoroughly reddened, when the child should be removed and wrapped, naked, in a hot blanket. These measures are calculated to bring the blood to the skin and to relieve the deep nerve centres. If such measures fail, and from the continuance of the fit danger is to be apprehended, an enema consisting of one tablespoonful of warm water and a few grains of chloral (the amount to be determined by a medical man) will rarely fail to bring the seizure to a quick termination.

Directly the child recovers, a purgative should be administered.

All causes leading up to the fit, such as chronic irritation in the bowel or in the gums, should be attended to.

Hysterical and Hystero-epileptic Convulsions.—These are of all grades of severity and may be attended by all sorts of phenomena. The following is the usual history of their occurrence. The sufferer is the subject of some, usually very trifling, abdominal derangement, of which too much has been made by foolish advisers and sympathizers, and the general health is below par. To these conditions is superadded some worry or mental strain, and on this an hysterical fit. In mild cases consciousness is not lost, and only in the most severe does *all* hold over the control powers of the mind depart, though some very powerful (very unusual) stimulus is required to stir such remnant of control power to action. If fear or indignation can be aroused in the sufferer's mind, she will often, after a fit of

some hours' duration, "pull herself together" of her own free-will in a few seconds, and even though, in appearance, she has been quite unconscious of sight or sound.

The treatment of these fits is that of the complaint, hysteria, of which they are part and parcel.

Occasionally, in the sufferers from hysteria, convulsions of an epileptic character, which character will presently be sketched, set in. They indicate merely reflex disturbance, the causation of which must be diligently sought for. Bromides should in these cases never be resorted to. They are, to the sufferers, *the most deadly of poisons*, paralyzing fatally and forever the remnant of control power, on the strengthening of which alone rest our hopes. If the medical man must be heroic in treatment, and cannot by means of the friends bring to bear on the sufferer the moral and mental medicine necessary for her cure, it is infinitely more humane to sweep away with the knife the ovaries, and thus bring sexual life and sexual disturbance to a premature close (provided, of course, the seat of irritation be, as it usually is, located in the ovaries) and thus give the patient a fair chance of something approaching a cure, than, on the plea of lessening the number of convulsions, to reduce her by frequent and large doses of bromide of potassium to the hopeless condition of chronic weak-mindedness that such treatment surely entails.

Hystero-epilepsy is undoubtedly difficult to cure, and its treatment is only successful according to the force of the mental alteratives—change of air, scene, and mode of life—that can be brought to bear. One of the worst cases I ever saw, in which the fit was preceded, or replaced, by apparently uncontrollable homicidal tendency, made a complete recovery when she passed from the condition of a chronic *habituée* at the out-door department of London hospitals to that of a hard-working mangler with no

one to sympathize with her ailments, to refer to them, or to treat them.

Epilepsy (*of reflex character*).—Under the one term epilepsy are comprised two very distinct disorders, the symptoms of both of which are, however, closely similar, while the causation and the prognosis of each are as the poles asunder.*

In fact epilepsy may be, and in the majority of cases is, a mere functional disorder of the nerve mechanism, the result usually of a state of chronic disorder and chronic irritation in some one part of the body — and in infantile convulsions, the result of teething, we have a typical example of such — or of the circulation in the blood of some impurity leading to mal-nutrition of the nerves, or perhaps, most usually of all, of both the aforesaid causes combined. That form of it which is the result of actual brain disease will be discussed in its proper place under the head of Inflammations and Degenerations of the Nervous System, the commoner functional variety alone occupying our attention at present.

Functional epilepsy is characterized by the occurrence at uncertain intervals of *convulsive seizures*, the disorder being, according to the severity of such seizures, known as "*le petit mal*" or "*le grand mal.*"

The fits of the "*petit mal*" are usually much as follows: The patient becomes, often without losing his feet, *momentarily unconscious*, the face being *deadly white* and the *eyes fixed.* Those of the "*grand mal*" are much more severe. In them some peculiar sensation, such as tingling travelling up the body, or pain in one hand, often immediately precedes the fit. This warning is known as the "*aura*

* Some authorities hold that epilepsy is due to sudden spasmodic constriction of the smaller arteries of the brain, the result of reflex irritation.

epileptica," and may, rarely, take the form of visual, auditory, or other sensory illusions. In one oft-quoted case the patient always said that before each attack he "felt a smell of green thunder!" Directly after the aura, and usually with *a piercing cry*, the patient falls to the ground and *becomes rigid*, the face being of a *deathly hue*. Usually, in a minute or less, the rigidity of the body gives place to *rapid, violent*, and *jerking convulsions* of the muscles of the face and the body generally, the face becoming *livid*. *Frothy matter*, sometimes *tinged with blood*, exudes from the mouth. To this stage, after a variable time, five minutes to half an hour or more, succeeds a state of quietude and torpor; consciousness, which *has been absent* throughout the attack, returning very slowly.

These two varieties of epilepsy, *le petit mal* and *le grand mal*, do not by any means include all forms of the disease, for spasmodic muscular contractions of epileptic nature may be confined to one muscle or one group of muscles (*Jacksonian epilepsy*), and be unattended by complete loss of consciousness; while other varieties, marked by transient mental aberration and by no convulsions whatever, are occasionally witnessed.

The treatment of functional epilepsy is, when conducted on the lines of reason, often remarkably successful in those who have been spared a course of bromide of potassium.

In every case a most diligent search, usually rewarded with marked success, for the underlying cause of the fits must be undertaken, as a first step.

In severe epilepsy, as in every instance of severe hysteria, we may take it for granted that there is present an inherent debility — usually an inherited one — of the nervous system.

Thus we have two conditions to contend with, a distinct

bodily ailment and a debility of the nervous system. Of these the first must be definitely set to rights, while the influence of the second factor in the complaint must be circumvented by means of measures calculated to improve the general health, and therefore to restore and maintain nerve tone.

The diet is of great importance, and this must, in most cases, be *as low as possible.* I have known many cases of this variety of epilepsy radically cured by a strictly vegetarian dietary, while nearly every case is relieved by its adoption. Alcohol should be forbidden, as also smoking.

It is impossible to give any other indications for treatment likely to avail, for each case has to be considered by itself. The condition of the sexual organs is often at fault, and in connection with them the cause of much of the epilepsy of young persons is to be found. Sometimes, when the aura commences in one part, as a finger, local measures, such as the application of the actual cautery, are desirable. In one case I amputated the last joint of a forefinger in which the warning always commenced, and cured the condition which had lasted for years. Any treatment that inspires the patient with confidence may, as in hysteria, also effect a cure ; and did space permit I could furnish many ludicrous examples of the influence of purely mental physic.

Of medicinal treatment I have little good to say. Bromide of potassium is a specious but traitorous friend to the epileptic, conferring on him, in return for a comparative immunity from fits, a permanently damaged nervous system, and reducing him to an absolute state of dependence on the drug. As with potent purges in constipation, so with the bromides in epilepsy, once fairly entered on the evil course, and go forward the sufferer must, for if

he attempts to discontinue the drug or diminish the dosage, the enemy that he thinks has been vanquished returns with such *ten-fold fury* that, in epilepsy at any rate, the sufferer is forced to remain in servitude, becoming rapidly feebler and feebler in mind and body as a result of the bromide habit. The only medicines from which any good may be expected are picrotoxin, in doses of $\frac{1}{200}$ of a grain, or strychnine, in doses of $\frac{1}{60}$ of a grain, in the pill form, thrice daily; but it is well worthy of note that in many cases, 20 grains of common bicarbonate of sodium, swallowed the moment the first warning of a fit occurs, will suffice to prevent the attack. This fact in itself is a pretty clear evidence that to a comparatively trifling stomachic derangement may the final cause of many an epileptic fit be traced.

Catalepsy is a condition characterized by intermittent attacks of more or less complete *suspension of voluntary motor power and sensation*, without convulsions, but with *rigidity of muscles*, so that the parts remain fixed in the position assumed at the commencement of the fit.

By mesmerism an artificial catalepsy may be induced.

There can be no doubt but that, like epilepsy, the cataleptic state is often the result of reflex irritation, the seat of which is not rarely in the ovaries. The sufferer is nearly always the subject also of hysteria.

Tetany.—A localized rigidity of certain muscles, usually confined to those of *the hands*, *forearm*, and *ankles*.

The result usually of reflex irritation, and not uncommon during the period of dentition in childhood, but sometimes seen in adults.

Resulting, in the vast majority of cases, in recovery.

So far we have studied the phenomena attendant on the temporary liberation of excessive motor force, as shown in convulsions or rigidity, the results of reflex causes. Ex-

traordinary as it may seem, there are many cases in which the very opposite condition, that of temporary paralysis of some muscle or muscles, ensues from the same causation.

Reflex Paralysis.—By what mechanism a constant and distant irritation, such as may exist in the womb, can, by conveyance to the nerve centres in the spinal cord or brain, cause *an abolition* of motion or sensation in a distant group of muscles, is at first sight difficult to comprehend, especially when it is remembered that in most cases, excitation, and not paralysis, of such muscles is the common result to be expected. The most likely explanation of this phenomenon is the following.

The nervous system controls the calibre of all blood-vessels, the special part of the brain in which this function is located being called the vaso-motor centre. Now it is surmised that distant irritation, especially that from the bladder, kidneys, intestine, or female reproductive organs, in those of indifferent nervous tissue, may send an impression to this vaso-motor centre, and that a localized contraction of the blood-vessels in some part of the spinal cord may result, such contraction implying of course temporary starvation and loss of function in the reflex nerve centres situate in the area affected. From this would result local paralysis.*

In localized paralysis it is therefore always wise to seek for a cause of irritation—stone in the bladder or kidneys is perhaps the commonest cause — and to remove such an irritant.

Reflex paralysis, even when it has lasted for many

* Some maintain that the condition opposite to that of paralysis—*i. e.*, over-action of the muscles seen in epilepsy, hysteria, etc. — is also set up by affections of the vaso-motor centre, causing in those cases a local *dilatation* of blood-vessels.

years, is a condition in which complete recovery may be hoped for.

Mesmeric States.—In mesmerism we have a series of functional derangements, closely allied both in their phenomena and in the mechanism which produces them, to the spasmodic, cataleptic, and paralytic disorders which we have just described.

In mesmerism the potent impression necessary to the symptoms does not, however, come from a distant internal organ, but travels directly to the brain—previously carefully prepared to expect certain results—by the nerve channels from the eyes and ears.

The will of the mesmerist has nothing whatever to do with the mesmeric phenomena in the subject, and no effort of the will on his part can produce any impression on an individual to whom previously, directly or indirectly, no clue has been given as to the likely direction of that will.

As one might expect, mesmerism can exert its influence best on those of weak control power—*i. e.*, the hysterical and the neurotic of both sexes, often persons of great intelligence, for the control power of the brain may be feeblest where the intellect is brightest. For persons of this class the frequent subjection to mesmerism is fraught with danger to the mental equilibrium ; they are already close enough to the border land between sanity and insanity, and any further weakening of control power in them—such as is the result of repeated subjection to mesmerism—may easily lead them across the frontier.

And now we turn to the organic disorders, the real diseases, of the nervous system of man, a gloomy record of local death in that tissue which is most essential to the highest life.

CHAPTER XVII.

ORGANIC NERVE DISORDERS.

THE NERVOUS SYSTEM.

Its Organic (Degenerative) Diseases.

1. *Of certain Cranial Nerves and of their Roots:*

   Bell's Palsy. Bulbar Palsy.

2. *Of the Spinal Cord:*

   Infantile Palsy. Pseudo-hypertrophic Palsy.
   Creeping Palsy. Spastic Spinal Palsy.
   Sub-acute inflammation of anterior, gray, horn, in the Spinal Cord. Locomotor Ataxia.
   Acute Ascending Palsy.

3. (*a*) *Of the lower Brain-centres:*

   Cerebro-spinal Sclerosis. Athetosis.
   Shaking Palsy.

   (*b*) *Of various portions of the whole Brain:*

   Apoplexy. Cerebral anæmia.
   Cerebral thrombosis. " inflammation.
   " congestion. " softening.

   (*c*) *Of Membranes of the Brain:*

   Simple Meningitis. Pachymeningitis.
   Tubercular Meningitis. Hydrocephalus (water on the brain).

4. *Of the higher Brain-centres:*

   Insanity, Dementia, Organic Epilepsy, Sunstroke, etc.

CHAPTER XVII.

ORGANIC NERVE DISORDERS.

I. ORGANIC DISORDERS OF THE NERVE FIBRES ONLY.

Inflammation, which, according to its severity, may or may not end in degeneration, attacks nerve tissue but rarely. Whenever it does so, it at first increases, then lessens, and often finally arrests, the functions of the attacked nerve.

All nerve inflammation is called **Neuritis.** Neuritis of the spinal nerves (called also "nerves of common sensation") may commence at the termination of the nerve twigs in the skin or the muscles, and is then often the result of a bruise or wound; or it may be the consequence of a blood poison—such as mercury, lead, gout poison, rheumatic poison, or syphilis—and may in the latter case attack the nerve (usually by inflaming its sheath) at any part of its course. Whatever the cause, nerve inflammation tends readily to spread along the nerve, and paralysis, temporary or permanent, of the nerve function is the outcome.

In the case of the spinal nerves, sensation and motion being their function, loss of motion and of feeling in the

affected parts are the results of their inflammation. With these there is usually combined wasting of the parts.

The extremities are the usual seats of attack.

The treatment of such paralysis must be directed to the removal of the underlying cause, and, unless there be actual evidence of a severe wound or concussion, lead, mercury, or syphilis will almost invariably be found to be at the bottom of the mischief. Complete recovery is not uncommon.

Neuritis of the cranial nerves, the nine pairs of "nerves of special sensation," which come from within the skull, is equally followed by arrest of their function. The following are, in numerical order, these nerves and their special duties in health:

First Pair—the Olfactory Nerves.—These are nerves of the special sense of smell. They pass from under the anterior lobe of the brain down into the nasal cavity. As the result of a severe blow on the upper part of the nose, or more rarely of brain disease, these nerves may die and their function be completely lost.

Second Pair—the Optic Nerves.—These are the nerves of sight. The same causes as in the olfactory nerve may lead to their paralysis and to *loss of vision.* Neuritis of the optic nerves is scarcely ever followed by complete restoration of sight.

Third Pair—the Motor Nerves of the Eyeball.—They supply with motion the upper eyelid, the iris (*i. e.*, the pupil), and the muscles that turn the eyes upwards, downwards, and inwards. Not unfrequently, as the result of accident, the twig that supplies the muscle which lifts the upper eyelid becomes paralyzed, and the lid droops. If the whole of one third nerve be affected, the eye—or eyes, if the pair of nerves be diseased—is drawn downwards and outwards (*i. e.*, squints outwards), and the pupil remains large and motionless.

Fourth Pair of Nerves are called the *pathetic* nerves. They assist in the nerve supply of that muscle of the eye by which the eyeball is turned downwards.

Fifth Pair of Nerves are called the *trifacial*, since each nerve splits into three parts; they go mainly to the face.

The *first part* of the fifth nerve supplies the eye with sensibility; the *second part* endows with sensation the nose, gums, and cheeks; the *third part* supplies the anterior two thirds of the tongue with taste, and a part of the cheek and the teeth with sensibility, while it also supplies the muscles of mastication with motion.

Inflammation or degeneration of the fifth nerve of one side, therefore, means loss of sensibility of the eye (to be quickly followed by ulceration and inflammation of the eyeball), loss of taste, and to some extent of smell and of feeling in the face, on the side affected, accompanied by loss of chewing power also on that side; the face being drawn towards the healthy side by the power of the unpalsied muscle there.

Sixth Pair of Nerves are called *the abducent*, because they supply the muscle that turns the eye outwards. Their paralysis results in *inward squinting*.

Seventh Pair of Nerves.—Each nerve is divided into two parts, the soft part (*portio mollis*) and the hard part (*portio dura*), the first of which is the *auditory nerve*, supplying hearing power, while the second supplies the muscles of expression in the face with motor power.

Disease of the soft part is followed by deafness, that of the hard part by loss of expression and of power to close the eye on the affected side of the face, the mouth being dragged across to the sound side. This is a not uncommon form of paralysis, and goes by the name of **Bell's Paralysis.** Recovery from it is frequent, as it is often due to a transient cause.

The Eighth Pair of Nerves are very complex in arrangement and function.

First part (the glosso-pharyngeal nerve) supplies taste to the back of the tongue and motor power to the tongue and throat.

Second part (the pneumogastric or vagus nerve) supplies the stomach, the heart, and the lungs, sending off branches, on its way, to the throat and box of the windpipe (the larynx).

Third part (the spinal accessory) divides into two divisions, one of which becomes blended with the pneumogastric, while the other supplies two muscles, one of the neck (the sterno-mastoid) and one of the back (the trapezius) with motion.

It is by means of the channel afforded by the vagus nerve that stomach derangement can produce irregular action of the heart, difficulty of breathing, congestion or even spasm of the larynx, and headache. Moreover, its distribution is wider even than that just sketched, filaments of it blending with other abdominal nerves.

Severe disorder of the eighth nerve means always death.

The Ninth Pair of Nerves are called the "hypoglossal," and supply the tongue with motor power. When one nerve is affected, the tongue on that side is flaccid, and the whole tongue, when protruded, is dragged over so as to point with its tip towards the sound side.

Thickness of speech and *difficulty of swallowing* are accompaniments of palsy of this nerve.

The inflammations and degenerations of the cranial nerves may take their origin in disease of that part of the brain from which they spring, and, indeed, this is a common cause.* Pressure exerted on them, as by a tumor or

* Thus, loss of functional power in one or more of the cranial nerves is a common sequence of apoplexy.

by disease of the bone channels through which they make their exit from the skull, is, however, to be kept in mind as also not an unfrequent cause of their breakdown; while, finally, but perhaps least frequent of all causes, may blood poisons be concerned in their partial or complete loss of function. The prognosis and the treatment in each case must be in keeping with the causation.

There is yet one form of degenerative disease, of formidable type, which affects not one, but several, of the cranial nerves simultaneously, and which originates in degenerative disease in the contiguous roots of nerves. It is called

Bulbar Paralysis.—This disease affects commonly the points of origin in the brain of the fifth, seventh, eighth, and ninth nerves. It is marked by an insidious commencement. At first, a loss of power over the tongue is noticed, then a want of expression in the face, then a constantly open state of the mouth, the saliva dribbling over the dress, then some difficulty in chewing and swallowing, all of which symptoms become gradually aggravated, the mind often at the same time growing obviously feebler.

The disease often lasts for years, death being due to interference with the heart or lungs, the result of palsy of the pneumogastric (the eighth cranial nerve), or to some inter-current attack, such as bronchitis.

II. ORGANIC DISEASES OF THE SPINAL CORD.

The spinal cord consists of a central *gray matter* composed of nerve cells, and in which the special reflex functions of the cord reside, which gray matter is arranged in a double crescentic form, the crescents being placed back to back, each crescent dividing its half of the cord into three divisions, made up of columns of nerve fibres going to or coming from the brain, and known as the *anterior*,

the *lateral*, and the *posterior columns of the spinal cord*, the whole being enveloped and firmly bound together by two membranes, the *pia mater* and the *dura mater*, between which again a serous membrane, containing fluid and called the *arachnoid*, is placed.

The functions of the spinal cord are thus to act as a long reflex nerve centre and as a conductor of impressions.

Only as the result of severe injuries, of the pressure of a tumor, or of great exposure to cold, is the whole thickness of the spinal cord attacked by inflammatory mischief, but the gray matter alone, or one of the columns, is not unfrequently the seat of a degenerative change which spreads upwards or downwards along the special part attacked, but does not often involve the neighboring spinal structures.

(*a*) Diseases of the Gray Matter of the Spinal Cord.

Infantile Paralysis.—The lesion in this case is confined to what are called the multipolar cells in the anterior horn of the crescent. It is usually unilateral, and therefore the symptoms, which are as follows, are generally confined to one side of the body. One part of the body, usually *an arm* or *a leg*, *loses muscular power* and *ceases to grow* in keeping with the rest of the body, remaining in adult life infantile in size and shape and almost useless. It is a disease of infancy.

Progressive Muscular Atrophy (Creeping Palsy). — This lesion, seen mainly in adults, and usually the direct consequence of overwork of a particular group of muscles in people who are constitutionally delicate or who are underfed, is situated also in the anterior horn, and gives rise to symptoms closely akin to those of infantile paralysis. Certain muscles, often *those of the hand and arm, begin*

to lose power and volume, the part attacked *wasting* eventually and becoming perfectly useless; little more than skin and bone being left. Often both sides of the body are simultaneously attacked. The spinal lesion nearly always extends to the contiguous gray matter, and then produces

Subacute Chronic Inflammation of the Gray Matter of the Anterior Horn of the Spinal Cord.—A disease in which *many* of the muscles of the body are affected, those *concerned in breathing and swallowing* being sometimes touched, the result then being speedy death. Bad as is the outlook when this secondary mischief follows on progressive muscular atrophy, it must be remembered that, being inflammatory in character, this latter disease may always subside, leaving the patient no worse off than before.

Pseudo-hypertrophic Paralysis, a disease of infancy, dependent (according to most observers) on a lesion in the centre of the gray matter, in which, while the muscles of a limb or limbs waste, an excessive development of connective tissue takes place, with the result that, while the *limb grows larger* than natural, it at the same rate becomes *more and more palsied.*

(*b*) Diseases of the White Matter of the Spinal Cord.

Spastic-spinal Paralysis.—A degeneration of the lateral columns of the cord on both sides. The earliest symptoms are a *peculiar irritability of the legs, with great increase of tendo-reflex,** followed by *difficulty in walking*, producing a *stiff, jerking gait*, like that of a Highland piper. When

* The tendo-reflex is that involuntary jerking forward of the foot which takes place when the forepart of the leg is hung loosely (as over the arm of a chair) and a smart blow is given, with the edge of the hand or the back of a thin book, just below the knee.

the patient is sitting, the limbs suddenly jerk. *The difficulty in walking increases slowly*, though the limbs neither waste nor suffer any diminution of feeling.

The causes of the disease are unknown. The prognosis is fair, and sometimes (presumably when the lesion is inflammatory) recovery occurs. The advance of the disease is very slow and involves no danger, in itself, to life, but is apt to become complicated, after a time, with other forms of nerve disease, especially with bulbar paralysis.

Locomotor Ataxia.—A bilateral degeneration of the posterior columns of the spinal cord.

Its onset is *gradual* and *varied*. Ofttimes the first sensation is that as of *a tight cord* constricting the body or one limb. This is due to the irritation of a nerve or nerves. Sometimes, in addition to these "*girdle pains*," there is a local paralysis of an arm or leg, or even of the upper eyelid, which then droops. "*Lightning pains*" shooting down the legs are also among the common early signs. Then follows, usually, incontinence of urine. Next, there is often observed—though this may be a very early phenomenon—a *difficulty in walking* and an *inability to stand steadily with the feet together and the eyes shut*. This latter symptom together with *abolition of the tendo-reflex* of the knee are distinctive features of the disease. Sometimes a partial loss of feeling occurs in the feet, the patient feeling as if the ground were always soft; or muscular sense is impaired so that there is hesitation in distinguishing with the hand differences in weight. The eyesight becomes affected in many ways, the field of vision becoming limited or color blindness being developed. The skin, the kidneys, and the stomach become deranged in different ways. Eventually the *cerebral faculties* themselves become impaired.

The cause of the spinal lesion is not unfrequently syph-

ilis; sometimes it is apparently the outcome of sexual excesses; ofttimes there exists no traceable cause.

The prognosis is always very grave, though recovery, especially in syphilitic cases, may occur, or the progress of the disease may become arrested.

The treatment in syphilitic cases should be directed to the constitutional taint; in other cases, medicine is worse than useless, and all efforts should be directed to the maintenance of health by ordinary measures, such as change of air, etc.

Acute Ascending Paralysis. — A degeneration of the spinal cord, confined (probably) to the middle of its lateral columns. It is characterized by the *sudden occurrence of weakness in the legs*, which gradually *extends upwards* to involve the muscles of the trunk and arms. It is *unattended by wasting or loss of sensibility* of the affected parts, or by cerebral symptoms. Usually it gradually creeps slowly to the higher regions of the spinal cord, whose functions it arrests, causing in such cases death by interference with the respiratory and cardiac movements.

Its treatment is unsatisfactory. No drug has any effect on it, but energetic means taken to improve the bodily health sometimes are successful in arresting its progress.

To the already formidable list of paralyses, the result of spinal disease, we have to add **Mercurial and Lead Palsy,** the former producing its ill effects directly on the spinal cord, the latter probably affecting in the first instance the muscles. Mercurial palsy is, therefore, never completely recovered from, while lead palsy, if wisely treated in the early stages, may completely disappear.

Finally, it must be remembered that the spinal cord may be the seat of a tumor, which by its growth, and the pressure consequent thereupon, may abrogate all spinal functions; or the cord may suffer compression by reason

of hemorrhage, the result usually of accident, within its membranes; or may even, as the result of injury or of severe exposure to cold, become throughout its entire thickness the subject of inflammation, so-called **Myelitis.** The result in all three events will be much alike in general characters, and will vary, of course, with the part of the cord affected, but in all cases the muscles and other structures supplied with nerves that branch off from the spinal cord *below* the seat of lesion will gradually or suddenly lose power and sensibility, and the muscles they supply will then tend to waste or even to mortify.

III. ORGANIC DISEASES OF THE LOWER BRAIN CENTRES.

(*a*) Those in which both Brain and Spinal Cord are probably involved.

Cerebro-spinal Sclerosis.—In this curious disease there are disseminated over the spinal cord and the lower brain centres small patches of hardened tissue (corpora amylacea) which consist of degenerated nerve tissue. The degenerative process is, however, not confined to such patches, but is of a more general nature, the nerve tissue throughout the affected part showing a tendency to an increase in its connective tissue and to a corresponding atrophy of real nerve substance.

The causes of these lesions are obscure.

The disease is, by reason of the succession of the following symptoms, divisible into three stages.

First stage, marked by peculiar, irregular muscular movements, absent at first during rest, and shown only when the limbs attempt to perform their functions, by a *succession of sharp jerks*, the speech itself assuming *a staccato character.*

Second stage, marked by *rigidity* of muscles.

Third stage, characterized by *weakness of intellect* and failure of the organic functions.

The termination is always in death, though the disease may last for many years.

Paralysis Agitans (Shaking Palsy).—This disease, which has, however, no fixed lesion, is not unfrequently mistaken for the one just described. The differences between them are, however, very considerable.

The following are the striking symptoms of shaking palsy: *Trembling, at first slight*, and to some extent under the control of the will, occurs in one part of the body, the arm, leg, or head, and gradually becomes more marked and *uncontrollable*. Unlike the movements seen in cerebro-spinal sclerosis, those in shaking palsy continue even while the sufferer *is at rest*, and are simply *rhythmical tremblings*.

Very slowly indeed—the process often covering several years—the shaking spreads to the other parts of the body, and is attended by great muscular weakness which causes the patient to bend forward on standing, and thus compels him, in order to maintain his centre of gravity, to run. This is appropriately called the "*festinant gait*" of paralysis agitans, and is quite characteristic of its advanced stages.

Sometimes the course of the disease is unmarked by other symptoms than those detailed, at other times "*girdle pains*," *dyspepsia*, *neuralgia*, *sciatica*, and a long train of disagreeables accompany it.

The *intellect remains clear* to the last. Death occurs usually as the result of some secondary mischief, such as bronchitis, induced by the general weakness.

The cause of shaking palsy is not known.

Athetosis.—The nerve lesion upon which the symptoms of athetosis depend is at present unknown. It is char-

acterized by *inability to retain the fingers and toes in any position* in which they may be placed, and by their continual *slow motion.*

Its causation is obscure; sometimes it succeeds apoplexy, but quite as often it occurs independently. Not in itself a fatal disease, it indicates always a partial degeneration of nerve tissue, and is therefore often, sooner or later, complicated by some graver nerve lesion.

The treatment of the three last-named diseases is very rarely followed by any good result that can be fairly accredited to a special drug. It is strange, however, that what must certainly be called the best medicine to palliate the symptom, belladona, is itself capable, in the healthy, of producing the almost exact symptoms of these three diseases. It must be given boldly, ten drops of the ordinary tincture, gradually increased to thirty, being administered thrice daily for a long period.

I have occasionally seen very gratifying results, of a palliative nature, from its use.

(*b*) Those in which the Brain only is involved.

Cerebral Hemorrhage, or Apoplexy.—We have already seen that degeneration of the arteries of the body occurs sometimes prematurely as the result of changes induced in their coats by the rheumatic, the syphilitic, or the gouty poison, while in old age such a change is a normal phenomenon of approaching natural death.

Such degeneration of arteries implies in them loss of elasticity, brittleness, and a tendency to give way in the parts of the body where naturally they have least support; and the brain is *par excellence* such a part.

The symptoms depend on the seat of the rupture and the amount of the resulting hemorrhage. Thus, a mere *passing vertigo*, or a *transient palsy* of an arm or leg, pro-

longed or permanent loss of power *in one half of the body*, or, finally, sudden death, may, according to the site of the cerebral hemorrhage, be the consequences of an apoplectic seizure.

Equally may the after-effects, on the mind, of apoplexy vary. Thus, in one man there will result no noticeable change, in another there will be seen a radical alteration in the moral character, while in a third there will ensue general mental feebleness, a sure sign that extensive brain softening has resulted from the presence of the blood-clot in the brain.

The treatment, in the first few days, consists in *most absolute rest*, and the adoption of measures likely to lessen the blood supply to the brain. These are, free purgation, a low diet, and the application of counter-irritants to the neck. Later on, every reasonable effort must be made to maintain and improve the general health with the minimum of exertion.

Cerebral Thrombosis, or Embolism.—In this disorder one or more blood-vessels of the brain become plugged, and, as a necessary consequence, a more or less extended part of the brain becomes temporarily or permanently starved and useless.

The symptoms are *akin to those of apoplexy*, but generally milder; sudden death being a rare result.

Cerebral Congestion.—This is a condition or state of the brain, nearly always transient and secondary to some disturbance in a distant part of the body, rather than a brain disease. The symptoms are usually *wakefulness*, *headache*, *irritability*, *excessive sensibility*, often *great excitability*, and sometimes *numbness*, *twitching*, or *slight paralysis* in various parts of the body.

Three forms of it are described.

The *apoplectic*, marked by *vertigo* and some loss of

muscular power; the *epileptic*, marked by a distinct convulsive fit, unpreceded by any cry or sensation; the *maniacal*, in which there is active delirium.

The causes conducing to an attack are over-excitement, overwork, obstructed circulation, indulgence in alcohol, and liver, stomach, or intestinal disturbance.

The treatment must be adapted to the causation.

The prognosis is usually favorable.

Cerebral Anæmia, or Bloodlessness.—This is the opposite condition to that just discussed, and is usually the result of general anæmia, defective heart power, loss of blood, or of a sudden rise of temperature.

The symptoms are, *headache, faintness, giddiness, inability for mental effort, pallor, drowsiness, dimness of sight*, and, in very bad cases, *paralysis, muscular twitchings*, and *convulsions.*

The treatment consists in removing the cause.

Cerebral Inflammation and Suppuration.—Sometimes, and usually as the result of severe injury, a part of the brain may inflame. The early symptoms will be those of congestion, the later will probably be those of brain compression — *i. e.*, *coma*, *muscular twitchings*, and *convulsions.* Sometimes the inflammation will end in **Abscess formation.** In the latter cases death almost invariably results. Abscess may, however, be dependent on other causes, as on general blood-poisoning or on cerebral thrombosis. In these latter the outlook is not so grave, and recovery may ensue. In some cases life has been saved by trephining the skull and evacuating the matter.

Cerebral Softening.—This may be the localized result of apoplexy or thrombosis or may be a general process. It is marked in the latter case by gradually *advancing mental weakness* and *general paralysis*, in the former by lesser mental and physical failures.

Cerebral Tumors — *e. g.*, cancer, etc.—exhibit symptoms dependent on their size and site.

(*c*) Those in which the Membranes of the Brain (*the Meninges*) are alone involved.

Simple Cerebral Meningitis.—The meninges, or investing membranes of the brain, are three in number: an outer one, destined for protection and called the *dura mater;* an inner one, the *pia mater*, crowded with small blood-vessels, which pass from it to the brain; and an intermediate, closed, serous sac, analogous to the pleura and pericardium, and containing, like those structures, serous fluid —*i. e.*, clear lymph—and called the *arachnoid.*

It will hardly surprise us, therefore, to know that the causes which lead to pleurisy and pericarditis suffice for the production of arachnitis, or simple meningitis, as it is more often called. Rheumatic fever, scarlet fever, or blood poison of any kind may induce it, equally with direct injury or severe exposure.

The symptoms are, *headache, giddiness, excitability, extreme sensitiveness to noise or light, wakefulness, delirium*, and *muscular twitchings* in the early stage, *torpor* and *coma* in the later ones, when the brain is compressed by the effused fluid in the arachnoid (which may become purulent).

Recovery can be hoped for only in the milder cases.

The treatment consists in the early and constant application of *cold* to the head, in an extremely *spare diet*, in *purgation*, and, if the patient can stand it, in the application of three or four leeches behind each ear. I do not think that the administration of drugs is of any avail, but those from which most may be hoped are aconite in the early stages and belladonna in the more advanced.

Tubercular (Scrofulous) Meningitis.—It could scarcely be

expected that scrofula, pre-eminently a disease of the lymphatic system, would spare the brain, which not only is surrounded by a lymph space, but contains in addition innumerable lymph channels.

As a matter of fact, in early youth, when the brain is undergoing rapid growth and specialization, it is frequently, in scrofulous children, the seat of tubercle—in other words, of consumption. The process generally commences at the base of the brain, and, as it leads eventually to a considerable increase of fluid within the ventricles of that organ, it sometimes goes by the name of *acute hydrocephalus*, but the term is a misleading one, being based on a secondary and not invariable symptom.

Tubercular meningitis is characterized by an insidious commencement, the child usually complaining of vague *pains in the head*, *nausea*, and *vomiting*, *giddiness*, and *disturbances of sight and hearing* in the earliest stages. To these signs succeed *squinting*, *delirium*, *muscular twitchings*, *convulsions*, *paralysis*, *irregular action of lungs and of heart*, a peculiar, oft-repeated *sharp cry*, and gradually *deepening coma*.

Death is often preceded by a return of consciousness.

The treatment is purely palliative, for the lesion is of necessity fatal.

Tubercular meningitis is *the* disease which results from the over-pressure at school of delicate, scrofulous children.

Pachymeningitis.—By this term is indicated a peculiar thickening of the dura mater, the result sometimes of injuries to the head, sometimes of alcoholism, rheumatism, or blood poisoning. It is often met with in the brains of those who have died insane.

Hydrocephalus, or Water on the Brain.—In addition to the lymph in the arachnoid space, the cavities within the

brain, called the ventricles of the brain, which are five in number, contain also in health a similar fluid. In delicate infants this liquid may constantly be secreted in excess, with the result that the brain becomes compressed and the *skull considerably enlarged.* This change generally takes place in the first year of life, and may even occur prior to birth. Very rarely does it commence in adult life, but it is sometimes witnessed even then, and may, if sudden, lead to what is called "Serous Apoplexy;" if gradual, to a slow enlargement of the skull; but in these latter cases it is generally combined with a bone disease, known as osteitis deformans.

Sometimes an increase of fluid in the arachnoid accompanies the effusion into the ventricles.

Water on the brain is generally a dependent of scrofula, the final and determining cause being often some trifling intercurrent derangement.

Complete recovery may occasionally follow infantile forms of the disorder; much more often partial recovery alone occurs, the child growing up sharp and clever in some things, but lacking mental balance and good judgment. The disease is, in infancy, not unfrequently fatal in a few days.

No treatment, beyond the adoption of simple measures for the general improvement of health is of any avail.

IV. ORGANIC DISEASES OF THE HIGHER PARTS OF THE HUMAN BRAIN.

Modern authorities on the subject, for the sake of convenience, often speak of the brain as consisting of three grades: a lower automatic one, possessed by man in common with all vertebrates; a middle one, the seat of some intelligence, some limited mind, well developed in all the

higher vertebrates ;* and an upper one, the organ of the purely human intelligence, and the possession of which in a state of high perfection places the lowest healthy man immeasurably above the highest of all other animals.

I have already said that the nervous system of the body, though of course an absolute essential to life, not only in man but in all composite animals—*i. e.*, of all animals consisting of many cells working together to form but one moving, sentient being — can yet be regarded, in relation to the great alimentary system, but in the light of a subsidiary system, a development from that food system which is *the essential* of *all* life, and which is well developed in plants and in the lowest animals innocent of any trace of nervous tissue. The disciples of the Darwinian school therefore, applying to the nervous system their evolutionary theory, maintain that the lower grade in the brain has been developed out of ordinary cell material, and that the two higher grades have, as a direct consequence of the unceasing struggle for existence on this earth, become gradually more and more perfected, till they have culminated in the brain of civilized man, whose attributes and varied powers have placed in human hands the absolute mastery over the rest of the creation.

Yet, though we may speak glibly of three grades of brain and of their genesis from tissue concerned solely in the alimentary process, as if we had in our possession a complete chart of all the nerve channels, nerve functions, and nerve cells of the brain, and a final knowledge of their means and modes of working under the ordinary conditions of life, it must be plainly owned that, spite of the diligent researches of the most eminent physiologists and microscopists, we can as yet lay claim but to a fair knowl-

* On pages 494, 495, I have spoken of but *two* grades, including in the lower brain both the lower grades here referred to.

edge of the lower, automatic brain centres; while of the two higher grades, as regards the manner in which they can manufacture any one of the powers of the mind out of common physical impressions, out of the ordinary known energies of Nature, conveyed to their cells from the nerve endings and along the nerve twigs which stud and traverse the body, and in what conceivable way the brain cells can retain for many years that negative called *memory* from which to reproduce, over and over again, impressions and ideas—all these things remain to us as great a puzzle as ever.

Such are the insurmountable difficulties acknowledged by the best neurologists, and they must form my excuse for dealing with the derangements of the higher human brain only in the following most general manner.

We know that the function of an organ wanes and dies in exact proportion as the physical structure, on whose perfection its powers absolutely depend, undergoes degeneration and nears its final goal, decomposition. This is as true of the brain and its special function, mind, as of the liver, stomach, and kidneys, and of their special duties.

Again, we know that two conditions mainly determine the date of failure in any particular organ—firstly, its perfection at birth; secondly, the way in which it has been used, the rate at which it has been worked; and that, in accordance with disadvantages in these two respects, it may show, while yet the rest of the body is young, signs of failure and premature breakdown.

Lastly, we have seen in the case of the many-functioned organs, notably of the liver, that a breakdown of any one of their functions may, and again according to the influences of those two conditions, precede by many years a general failure of the organ, and that thus a man may be bilious

in youth, gouty in middle life, and eventually glucosuric in old age. In the case of the brain, with its numerous functions, these departmental breakdowns are of many and various kinds, and while in themselves of evil omen, are nevertheless of use as warnings, as strong injunctions, to wisdom and economy which, when duly weighed and acted upon, may often save the subject from premature dementia.

Thus **Dementia** is the natural but distant goal of all mental life, and the equally natural but near goal of all grave brain disturbance.

Let us now briefly trace the influence of heredity and of misuse, respectively.

Heredity.—The influence of this factor in mental failure is the same in kind in the case of the brain as in that of every variety of physical breakdown. The offspring is a blend, in varying proportions, of its parents; if these have been unlike in race and physical characters, the child will have all the peculiarities of each toned down; whereas, if there has been a striking similarity in the distribution of vital strength in both father and mother, the offspring will generally—for the influence of other conditions may always possibly modify it—inherit a double dose of their special physical vices. This is why the intermarriage of near relations, unless the medical history of each is singularly perfect, is so inadvisable, so fraught with danger to the offspring of such unions.

Misuse.—To misuse, rather than to the sole influence of heredity, is the vast mass of insanity and of premature dementia due. Were only a knowledge of the great laws of physiology and of our physical structure universal, instead of being, even in the most enlightened circles, exceedingly rare, much of disease, bodily and mental, which we witness and deplore, might be averted. The child of

the neurotic and of the non-neurotic are provided with the same brain diet, and both are too often fed by force. The feeding and the method of doing it, in both instances, are generally utterly unscientific, involving much unnecessary wear and tear of brain tissue, but they tell naturally most of all on the one who has had the misfortune to enter life a mental cripple. The absurdity is brought more forcibly to our understandings if we seek for analogy in other forms of hereditary weakness, say in gout. Suppose that all children and adults, gouty and non-gouty, were subjected from early infancy to a Strasbourg-goose system of forced and full alimentation. The gouty families would very quickly die out, and this would, in some ways, be perhaps a gain, were it not that the evil system of feeding would convert many of the non-gouty into gouty subjects, and thus keep going or even intensify the complaint. It is exactly so with the brain. Parents must learn to recognize the various forms of brain weaknesses in their children and to read correctly their earliest phenomena, and in the mental pabulum to make as skilful an allowance for these peculiarities as they do in the case of the gouty and the scrofulous infant. They must learn, moreover, that generally it is not in the case of the brain, any more than in that of the liver, the whole organ which is faulty, but only a part of it, the rest being strong and perhaps singularly well developed.

Thus, in the neurotic, the intellect is keen and precocious, the mental grasp rapid and sure, while the control powers of the brain are often so faulty that, suddenly, when a brilliant career, with every inducement to persevere, has been opened to such a one, the will power in one particular direction fails, and a craving for, and a rapidly fatal indulgence in, alcohol wrecks every hope. In fact, brilliancy of genius is but too often a sure indication of

mental instability ; the very rapidity of manufacture and the richness of the mental product being but too evident a proof that a simultaneous development of all the brain functions, essential to mental health, is wanting, and the offspring of the cleverest people often show by their obvious mental weakness how unhealthy were the parental talents, so highly prized because so far out of the common.

So various are, however, the attributes of the brain, and from so many different quarters may, therefore, disorder spring, that in the space at my command I cannot venture to give directions, but must simply confine myself to a strong recommendation to all parents who are conscious in their family history of any form of mental weakness to consult those skilled in this great and important subject of the brain, and to abide by their recommendations as to their children's education and the special precautions to be taken to avoid an undue strain being thrown on the weak department.

But not only should the influence of heredity and the skilful evolution of all minds, especially of the weaker ones, receive ever the most judicious consideration at the hands of all those who have charge of the young, but such people must also be reminded that the brain is not to be viewed exclusively as an organ by itself, but as an integral part of the body, in all whose trials and derangements it must bear a part. To avoid the onset of insanity in cases where there is the slightest predisposition thereto, it becomes, then, of the first importance to maintain the standard of general health by judicious feeding, by abundance of recreation, by exercise, by fresh air, and by other known methods, as well as to recognize, well in advance, the periods of life upon which, even in the soundest health, unusual stress falls on the nervous mechanism. We will briefly notice these periods.

Certain Periods in Life fraught with Danger to Brains Predisposed to Failure.

The first anxious period of life is that of puberty. A new system, the reproductive one, is suddenly added to the body, and makes demands on it which should receive due attention. The influence of this change, always strong, is, in my opinion, much more felt in the male than in the female. In the former, melancholic, hypochondriac fears or actual insanity, nearly always strongly tinged with sexual passion (or sexual fears), are not uncommon, while in the female the train of disordered thought usually takes an opposite direction, and the melancholy or actual insanity is generally of a religious character. It is a common medical experience to find that the mind of a sufferer has for long been laboring under disorder ere the guardians or parents have awoke to the fact that the disease is not depravity, sullenness, or biliousness, the treatment for one of which has done unbounded harm, first by deranging the health, and secondly by raising in the already morbidly sensitive mind of the sufferer resentment at what he recognizes as unjust treatment without being able to describe his real malady.

When adolescence has been passed without any mental disturbance whatever, the outlook for life is, even in cases marked by a history of insanity, usually hopeful as regards the brain.

The other periods of life which are fruitful in danger are confined to the female sex, and are the menstrual periods, the times of pregnancy, parturition, and suckling, and what is called the "change of life." Transient mental derangement in the first of these is by no means rare, while the dangers of insanity in those predisposed to it are always great in the months that precede childbirth, the

actual lying-in period, and the ensuing time of lactation. It is, however, at what is called the change of life that very often a great interference with mental stability is observed. Not unfrequently a woman, hitherto, apparently, endowed with much common-sense and temperate in every habit, will at this time become hysterical and exhibit a strong craving for alcohol, while in other cases a chaste woman may become quickly transformed into a being whose mind is crowded with erotic ideas. Many of these cases are all the more distressing, inasmuch as, the stage of legal insanity not being attained, the individual is apt to be misjudged, or, if the real underlying cause of mischief be discovered, not efficiently treated, because she cannot legally be placed under effective control.

It is a popular saying, and, like all popular sayings, it embodies a great, though an obscure truth, that the subjects of grave disorders, particularly of gout and asthma, both of which we should, *à priori*, suspect of a great power of shortening life, live to a good old age, often dying from some disorder not in apparent connection with their lifelong enemy. The same may often be said of the neurotic, including under this term those strongly prone, from any cause, to insanity, and eventually to premature and complete mental failure. I have known scores of the latter who have, over and over again in the course of their lifetime, been apparently on the very verge of madness—and one, a distinguished Scottish writer, who had more than once voluntarily placed himself under arrest and supervision in an asylum—and who yet have never once been insane, but have reached a full age, dying with their mental powers intact. Sometimes the nervous attacks are distinctly periodic, recurring every one, two, or three years; sometimes they recur at uncertain intervals, their advent being favored by any greatly depressing cause.

They are always, however, succeeded by a restoration of mental balance ; the mind being, for long after their subsidence, remarkably clear. It is exceedingly uncommon for any such individuals to become actually demented, for these functional recurrent attacks, like those of gout, not only do, though in a way we cannot trace in brain tissue, evident good, clearing the mental, as does a storm the physical, atmosphere, but they also, in the vast majority of cases, teach the sufferer instinctively to shun such states and conditions of life as, by the worry and mental anxieties which they induce, would be likely to end in a fatal overstrain of nerve tissue. After all, how truly beneficent are those bodily disorders, those cell revolutions, which we witness in the body ! It is exceedingly rare for the chronic dyspeptic to die of organic disease of the stomach, for the chronic sufferer from uterine disorder to die of malignant disease of the womb, for the periodic sufferer from biliousness, gout, or glucosuria to die of organic liver disease, for the man who suffers from fits of nervous depression, or of hypochondriasis, to die of brain-failure ; the vast majority of those who are attacked by organic disease of the stomach, womb, liver, brain, etc., have never had a warning, a single fear of the catastrophe which has overtaken them, and, strange to say, when attacked they are, as a rule, throughout the course of the malady, apathetic. There is no stronger contrast than that which is witnessed between the anxious attitude of a sufferer from some functional and comparatively unimportant disorder, and the indifferent, half-incredulous manner in which an anouncement of the existence of severe and unexpected organic disease is met. The man who is becoming insane is nearly always cheerful and jolly before his attack, and quite unconscious of the presence of any near danger, while, even if melancholic, he does not complain of the depression and

seek sympathy and relief, but remains sullen, silent, and hopeless, nursing in his mind some embryo delusion, but unmoved by any threats of restraint in an asylum.

Let us now discuss, also in a general way, the *legal and social aspects of insanity.*

No satisfactory definition of insanity has ever been produced, nor is such a definition conceivably possible. The functions of the brain are so many and so complex, and each human being is a blend of so many different people who have lived under such diverse environments, that no two brains can ever, in all their functions, their modes of dealing with similar impressions, agree. No fixed standard of sanity is, thus, possible. For the maintenance of social order, a certain rough standard has been prepared and is followed in every civilized country, though the codes of law built upon it necessarily vary with the race. Such a standard is founded upon a certain consensus of opinion as to the necessary relations of the individual to society, and all deviations from it are classed as legal insanity. For long the doctors have ridiculed and abused this legal view, and have pointed out with perfect truth the unscientific basis on which it rests. Nevertheless, a really scientific code of laws regarding insanity would logically be compelled to throw its ægis over nine tenths of our criminals, and would thus for a certainty tend to the wreck of all society, while being absolutely just as regards the individual.

The healthy brain, like all other healthy bodily organs, follows and obeys strictly the physiological laws of life. Provided it be healthy at the start, and suitably supplied with blood, it guides its possessor through the world, and is itself unaffected by any special time of life, being able unmoved to meet the demands made on it at such periods, as well as by all the ordinary anxieties and trials incident to human existence. Its various parts act together in

thorough accord ; it manifests no great and special brilliancy, except that evidently in keeping with a careful special training—in other words, it exhibits what may be called capacity rather than genius.

All departures from this type may be, in proportion as they fall off from the standard, reckoned as brains liable to partial or complete premature failure, sometimes evidenced as actual insanity terminating in dementia, but more often appearing only as occasional fits of despondency, of hypochondriacal fears, of defective control-power, of great irritability and depression. The biographies of many of our greatest geniuses contain abundant evidences of the fearful mental storms through which they passed, states which to many are absolutely incomprehensible.

Abnormal vicious propensities, at least in the absence of any but extraordinary surroundings ; a morbid craving for excitement, sympathy, or stimulation ; irritability ; extreme sensitiveness ; self-consciousness and self-introspection, are all signs of an abnormal brain, while all compatible with the existence of great intellectual power.

In short, the badly balanced and the ill-formed brain may produce phenomena of all shades of vice and of vicious tendency, and of all grades of crime. Fortunately for mankind, the blind vengeance of the law acts as a sufficient deterrent for crime in all but the worst cases, the rest keeping the secret of those evil tendencies, over which they have at times such difficulty in obtaining a mastery.

Dementia, or annihilation of the functions of that upper-brain grade which is distinctively a human possession, is the end of all brain failure. In fact, Dr. Clouston, an eminent authority on the subject, would simply define mental disease in all its phases as a "tendency to dementia."

Special Brain Disorders, not, strictly speaking, Insanities.

Organic Epilepsy is of this class. We have already spoken of reflex epilepsy: we have now to deal with a disease presenting in one of its phenomena—the convulsive seizure—a close likeness to it, but which in causation, prognosis, and treatment is an utterly distinct disease. According to Dr. Hughlings Jackson (*Journal of Mental Science*, November, 1888), organic epilepsy commences in some part of the highest nerve centres and travels downwards to affect the lower reflex ones, which latter are the ones almost exclusively involved in functional epilepsy. The actual fit in both varieties is alike, though it is usually more severe and more lasting in the organic form. Always in organic epilepsy is the mind, from the very first, affected, and, as the disease advances, this fact becomes evident, and necessitates careful restraint, for the epileptic lunatic is often subject to uncontrollable impulses to homicide. The sufferer from this severe disorder should be placed early and completely, for his own comfort, under the bromides. It is true that these drugs favor the advent of dementia, but they also lessen the number and severity of the convulsive seizures and the tendency to deeds of violence.

Sometimes it happens that the brain of the incurable epileptic presents after death no trace of any lesion, but not unfrequently also a tumor, a chronic brain abscess, or a protruding piece of the inner table of the skull, broken by some accident, while the external layer of bone has escaped fracture, is the obvious cause of the malady. Cases are on record where the operation of trephining the skull has resulted in the permanent cure of the worst forms of epilepsy.

Sunstroke is a well-known disorder, undoubtedly affect-

ing primarily the brain, and often permanently impairing the mental powers, without showing, as adequate cause of its mischievous course, any fixed cerebral lesion.

It is caused by exposure to great heat, especially when the air is charged with moisture and the skin is impeded in its functions; its attack being favored by overcrowding, over-exertion, and intemperance. Many cases of sunstroke occur after sundown.

There are two forms of it. In the first, the brain centre that controls the heart's action is affected, and death results from *simple heart arrest;* in the second, there is *gradually deepening coma,* with *paralysis* and *convulsions.* There exist, however, many mild forms, attended merely by *vertigo, headache,* and *mental discomfort.*

The outlook as regards complete mental recovery is never very hopeful. Permanent impairment of the mind and sometimes epilepsy are occasional sequences of a severe attack.

The treatment of sunstroke consists in absolute rest in cool, dry air, and the constant application of cold to the head. By some authorities, purgation, blistering of the back of the neck, and even bleeding, are recommended.

In addition to the above diseases it would be easy to add an extensive list of less known but kindred complaints in which physical infirmity foreshadows mental failure. An example of this is seen in the **progressive paralysis of the insane,** where sudden loss of voice, or difficulty in articulation, due to partial palsy of muscles, often precedes by months those extraordinary hallucinations of fabulous wealth — a real *embarras de richesse* — which mark the commencement of rapid mental decline.

In all of these, however, as in organic epilepsy and sunstroke, the brain disorder is the primary and only real disorder, the motor disturbances being but secondary consequences thereof.

No. 3.—The Motor System.

CHAPTER XVIII.

DISEASES OF THE MOTOR SYSTEM.

THE MOTOR SYSTEM.

The Muscles:

Their Functional and Organic Disorders.

The Ligament.

The Bones:

(*a*) Their Functional Disorders.

(*b*) Their Organic Diseases.
- Caries.
- Necrosis.
- Periostitis.

(*c*) Their Degenerations.
- Rickets.
- Osteomalacia.
- Osteitis deformans.

The Motor System.

CHAPTER XVIII.

DISEASES OF THE MOTOR SYSTEM.

The organs of the motor system are the muscles, bones, and ligaments.

Motion and locomotion of the human body are performed by a system of leverage, of which the joints supply the *fulcra*, the bones the *levers*, and the muscles, by means of the energy stored in their cells and derived from the combustion of food, the *power*.

The *direction* of the movement is under the control of the nervous system, down the fibres of which pass, to the muscle cells which it is purposed to work, the impulse necessary to set free the stored energy, the effect of which is to cause a contraction in such cells and thus to set up movement in the levers (the bones) to which the muscles are attached.

The muscles are connected with the bones by smooth tendons.

THE MUSCLES.

Of these there are two distinct kinds, the red, voluntary, and striped muscles, exceedingly rich in blood (whence their color), under the control of the will, and attached to the bones; and the white, involuntary, and

unstriped muscles, much less abundant, not under will control, and not attached to muscles, but found in the walls of hollow cavities, such as the stomach and bowels.

The heart forms an exception to the rule, for it is a hollow muscle, whose fibres consist of involuntary, but striped, muscular fibre.

The Functional Derangements of Muscles.

By reason of an impure or an imperfect blood supply, or by reason of loss of power in the motor nerves which pass to them, muscles may lose partly or completely their power of movement, either temporarily or permanently. It does not follow, however, that under all such conditions a muscle will waste, for this will depend largely upon the implication in the disease of the nerves which regulate the calibre of the blood-vessels that supply the muscle cells. Nor may sensation be necessarily abolished or diminished when motor power is in abeyance, for that again depends upon the condition of the sensory nerves which pass from the muscle to the spinal cord and brain. On the other hand, sensory or trophic (nourishing) nerve force may be impaired, while motor power may be but little affected.

Pain, without obvious cause, may be experienced in *muscular tissue*, and may be of *rheumatic* or *gouty* origin or due to an impoverished or tainted blood supply. Though this symptom may occur in any muscle, it is particularly common in the muscular tissue which clothes the left front of the chest wall, when it is called **Pleurodynia.** The treatment of troublesome chronic muscle pains consists in improvement of the general health, which is always deranged, in exercise of the muscles, in fresh air, a simple dietary, frequent baths, and, if necessary, in friction over the painful part.

Degenerative Diseases of Muscles.—Muscles may be the seat of tumors of various kinds, of abscesses, of effusions of blood, etc. To one form of degeneration, the fatty one, they are very prone. Muscles long paralyzed undergo often this change, becoming then permanently useless, while after severe fevers, and in chronic debilitating disease, this degeneration may often be seen attacking, here and there, some one or more muscles or groups of muscles. In these latter cases, if the general health improves, complete recovery may be secured.

THE LIGAMENTS

consist of bundles of delicate, non-elastic fibres bound firmly together. Their function is to support the joints, uniting the ends of contiguous bones, which they sometimes completely surround.

The ligaments are not very liable to be attacked by primary disease, but they are commonly involved in joint disease produced by rheumatism, gout, degenerative changes, etc., and may then be partially or completely destroyed.

THE BONES

are of two kinds, the cartilaginous and the osseous, the former being a preliminary stage of the latter—*i. e.*, all bone is at first cartilage, the cells of the latter, as development advances, gradually secreting hard, bony material. The bones consist, when fully developed, of about one third animal matter (living cells, etc.) and of two thirds bony deposit. They are abundantly supplied throughout their entire thickness with blood-vessels.

All bone is completely surrounded by a dense fibrous sheath, called the *periosteum*, which is very richly supplied with blood and plays a leading part in the nutrition and growth of bone.

Functional Disorders of Bones.

It is questionable whether there are really any disorders that come under this heading, for though "aching of the bones" is indeed a frequent complaint, the actual seat of pain in those cases is almost invariably the synovial membranes of the joints, or the ligaments and tendons appertaining to them, or the muscles of the part, or, more rarely, the periosteum of the bone, all of which are liable, by reason of rheumatism, syphilis, mercury, gout, or other blood poison, to painful disorders.

Organic Disease of Bone and of its Periosteum.

Inflammatory Disorders ending often in Degenerative Caries.—By this term is understood a limited inflammation of bone ending in softening and disintegration of the portion attacked, accompanied usually by suppuration of surrounding muscular tissues—*i. e.*, by abscess. It attacks most commonly the spinal bones, the short bones, and the ends of the long bones of the arms and legs.

The cause is to be traced to a local breakdown in the lymphatic system, the consequence of scrofula, syphilis, or mercurial poisoning. In syphilis the bones of the head are often the seat of the disease.

The symptoms are obscure at first and usually attributed to rheumatism. There is, then, deep-seated pain, worse generally at night; to this succeeds after a time local swelling and redness; then the formation of an abscess, in the discharges from which spicules of dead bone occur. At the bottom of the abscess may readily be felt with a probe the bared, crumbling bone tissue.

The treatment consists in improvement of the general health, and in surgical measures calculated to remove thoroughly the diseased bone. When radical steps in

this disease are not early undertaken, the abscess continues to discharge, the health fails, and the osseous disease advances to threaten life by its consequences.

Necrosis.—By this term is implied death of a large piece of bone, not by slow crumbling as in caries, but by some interference with the main blood supply of a considerable portion of a bone, the diseased part coming away in one or more pieces.

The seats of disease are generally the last joint of the finger, the result sometimes of whitlow; the skull or collar-bone, the sequence of syphilis; the lower jaw, the consequence of the irritating fumes of phosphorus coming in contact with decayed teeth in match-makers; and the shafts of the long bones of the extremities in scrofulous children.

Scrofula, syphilis, mercury, and phosphorus fumes are the causes of nearly all cases which arise without sufficient external injury to account for the violence and extent of the disease.

The treatment is the same as that for caries, but surgical procedures are more necessary and more severe.

Periostitis.—When the sheath, or, as it is called, the periosteum, of bone becomes inflamed, a state of matters by no means rare, the following are the symptoms generally observed.

There is *localized pain* of *a sharp, rheumatic character*, aggravated by heat, and therefore *worse at night.* In addition to this, on passing the finger over the bone there will generally be no difficulty in detecting a hard swelling on its surface, called a *node*, and due to an effusion of lymph between the hard, unyielding periosteum and the bone. When, as in scrofula, syphilis, and mercurial poisoning, the process is a slow one, there will often appear, for a long time, no further symptoms, and the lymph will,

usually, be re-absorbed under proper treatment. In other cases, the result of accident and occurring in persons whose blood is in an impure state, recovery is not so general, and the bone often begins to be itself the seat of inflammation, and the further symptoms of *great tenderness* and swelling over the part, *high fever*, and *mental depression* supervene. Such cases often end in suppuration, a deep abscess being formed, and caries or necrosis of the bone being, towards the end, developed. In all cases of periostitis the treatment is surgical and directed to the relief of "tension," that is, to the incision of the swelled periosteum ere it, or the subjacent bone, die from the continuance of the pressure resulting from the effused lymph.

Degenerations of Bone.

Rickets (Osteomalacia Infantum).—This well-known disease consists in an excessive growth of the cartilaginous, with defective formation or sometimes actual re-absorption of the hard parts, of certain bones, which in consequence bend, according to the weight, traction, or pressure brought to bear on them.

It is almost exclusively a disease of childhood, the second year of life being the commonest time of appearance.

The symptoms are of two kinds: (*a*) Those of general ill-health: *pallor*, *imperfect digestion*, profuse *perspiration*, especially of the head at night, *stunted growth*, *enlarged tonsils* and *lymphatic glands*. (*b*) Those confined to the bony changes. The *head becomes large* and *the forehead prominent*, the openings of the infant's head (the fontanelles) closing slowly. The chest becomes *narrow and often pointed* (pigeon-breast). The spine may become much curved, and the bones of the pelvis distorted. The most noticeable feature is, however, the *bowing of the legs*, which bend under the weight of the trunk.

Not all of these symptoms may, however, be present in every case.

Causes.—Debility in the parents, who may have been too young, delicate, badly nourished, or intemperate in habits. Frequent parturition in delicate women is apt to result in one or more rickety children. The onset of rickets is favored markedly by bad diet, by insufficient fresh air, and by the strain of dentition.

The outlook is usually reassuring. Good nourishment, fresh air, and suitable clothing and care will generally suffice to restore the sufferer to health. Some few very bad cases die; many retain throughout life marked traces of their deformity.

The treatment is purely hygienic and dietetic. No drug is of any avail. The ridiculous and most mischievous recommendation to administer additional phosphate of lime to children who cannot assimilate the amount already present in their food, or whose bodies are absolutely re-absorbing what lime has already been deposited in their bones, has fortunately ceased to disgrace medical literature.

Osteomalacia, called also "*mollities ossium*" and *adult rickets,* is a somewhat rare disease, occurring most generally in women at, or about, the change of life.

The symptoms are produced by a re-absorption of the earthy phosphates (which pass away in great quantities in the urine) in the bones, their structures consequently softening and giving way under ordinary strain as in infantile rickets.

It commences commonly in the pelvic bones, which sink in, *lessening by some inches the patient's height;* then the process invades the spinal column, which also yields, further decreasing the stature; lastly, the bones of the arms and legs are affected, and also, but to a lesser extent, those

of the head. All the bones break very easily, no reunion being procurable. Generally these changes are accompanied by *rheumatic pains* and by *great loss of strength and flesh*, but sometimes the health is but little impaired. The disease, however, usually shortens life by many years. The precise cause of this malady is obscure, as also the reason why it, by preference, selects the female sex. The treatment, never very successful, consists in attention to the general health.

Osteitis deformans is a similar disease to the one just described, but a rarer one. It is marked by an absolute enlargement of certain bones, accompanied by a softening process akin to that seen in osteomalacia. Loss of height, bowing of the legs, and marked enlargement of the head, accompanied often by calcareous degeneration of the arteries, are the symptoms. There is rarely pain. This disease is commoner in the male than in the female. Its causation is unknown, its treatment unsatisfactory.

Cancerous and other tumors, abscesses, etc., of bone as of other tissues, occur, but do not demand notice at our hands.

With this brief review we may dismiss the motor system, the derangements of which the surgeon claims almost exclusively as his department. Strictly speaking, this system is but an integral part of the food system, and, in a medical treatise, deserves only on the score of its special function—locomotion—any separate notice.

No. 4.—The Reproductive System.

CHAPTER XIX.

DERANGEMENTS OF THE REPRODUCTIVE SYSTEM.

THE REPRODUCTIVE SYSTEM.

Brief General Remarks on the Functional and Organic Disorders of this System.

The Reproductive System.

CHAPTER XIX.

DERANGEMENTS OF THE REPRODUCTIVE SYSTEM.

A FEW words, more to remove popular misconception concerning it than to classify its disorders, will suffice for all that is necessary to say, in a popular work, about the reproductive system.

In the first place, there is a wide difference between the influence exerted on the whole body by disorders of this special system, in the two sexes of mankind.

In man the sexual instinct is, as in all male mammals, strong, constituting in a state of nature one of the ruling passions of life. This fact should not be blinked, but rather be openly admitted, with a view to its judicious curbing in accordance with the rules of religion and of modern society, and which curbing can only be effected by a careful training and cultivation of that control power, that subordination of the wild instincts of man to the dictates of his reason—the decisions of the higher brain centres—the possession of which, more than anything else, marks civilized man off sharply from the brutes.

The healthiest type of brain is, then, that which contains the most efficient control power; the least healthy type that which is altogether wanting in this force, the brains

of those who are, by common consent, removed from the society of men—the insane and the demented. But between the two extremes there are many grades.

An overmastering tendency to follow the instincts or the inclination of the hour is a strong characteristic of a deficient or badly co-ordinated brain. Thus, in man, we find an inherent tendency to sexual excess, linked strongly with, and often ending in, insanity; not that the excess produces the mental failure, or even, in many cases, contributes much to it, for it ranks merely as a symptom of the pre-existing, underlying mental weakness.

The sexual instinct, then, being strong in the male, it follows that, in order to avert the many ruinous consequences that ensue from its undue gratification, the best way is to seek early in life to strengthen that barrier, which alone can be relied on for protection, the control power, by the practice, in many little things, of cheerful self-denial. Above everything, youth should be taught the great physiological fact that continence, even lifelong continence—provided it be a chastity both of mind and of body—is not only consistent with, but directly conducive to, the highest health and the greatest success and happiness in life, and to view with aversion and contempt those lying guides who—whatever their genius and literary talents—seek to propagate the false and inhuman doctrine that self-gratification is both manly and necessary. It is almost unnecessary to add, that in all families in which there is a history of insanity, these precautionary measures require the greatest possible attention.

Functional derangements of the organs of reproduction are fairly common in the male, but are almost always, at least under fifty years of age, *secondary* to some derangement of the nervous system. They are never benefited by tonics. There is no actual failure or debility present,

merely a loss of co-ordination of nervous power due to general nervous weakness, and this is to be met by an abundance of healthy out-door exercise, of manly society, and by other measures calculated to bring again the nervous mechanism into trim. Five grains of bromide of potassium in a little syrup, taken three times a day for a week or two, will, in nearly every case, by its steadying influence on the nervous system, expedite, or actually suffice to, a cure.

Organic disorders of the reproductive organs are very rare in man, and when they occur require surgical measures for their relief.

In woman, affairs as regards this system stand on quite a different footing.

In the *healthy* woman sexual passion counts for nothing, or for very little. Certainly it, alone, does not, as is so often the case in man, constitute a ruling factor in the course of the life history. In many healthy women it is, indeed, entirely absent. The craving for sympathy, love, adulation, and, above all, the strong instinct of maternity, replace it. When, in woman, powerful sexual passion really exists—and is not skilfully simulated—it constitutes always a reason for suspicion of some mental failure behind it, and at certain periods of female life, notably during and just after parturition and at the change of life, erotic fancies and imaginings are almost always synonymous with commencing insanity. Merely changing the sex, we may then, in regard to women, adapt the epigrammatic saying of Larochefoucauld, "Une sotte n'a pas assez d'étoffe pour être bonne."

On the other hand, from the size and number of organs concerned in parturition, a long list of functional and organic diseases peculiar to women exist.

Of these, however, *the functional disorders*—in which

class we may include nearly all misplacements, congestions, and ulcerations of the womb—perhaps ninety per cent. of the special female derangements—are not local maladies, to be attacked by instruments, replacers, supports, caustics, etc., but merely localized indications of some general bodily failure, usually a general muscular atony, so common in the female sex, or a general nervous debility, or more rarely they are of scrofulous origin, but in any case only to be cured by means directed to the improvement of the general muscular and nervous tone. The application of these measures must, of course, be conducted with skill and care. It will not do to tell a sufferer from incessant "bearing-down" to get up and take long walks or to indulge in violent horse exercise. A course of massage, by improving muscular power and restoring the digestive powers, will often be the first step, from which an advance may be made by a visit to some bracing health resort, to be followed perhaps by a sea voyage. The reader will say that such measures are beyond the means of poor sufferers, but, as a matter of fact, the sufferers are but rarely poor; the woman who has to earn her daily bread rarely can find time for such a luxury as a functional womb derangement, which is often as much the product of an ardent imagination, an enthusiastic specialist, and a desire for sympathy and leisure, as of a real lesion.

The organic diseases of the reproductive system of women are very grave and real disorders, but there is nothing special about them, nothing that entitles them to rank in medicine as mysterious disorders, and nothing that necessitates their being handed over to a special surgeon, for surgical means are, when any treatment is likely to avail, the only ones that can, with hopefulness, be had recourse to.

To sum up. The functional disorders, the incompetencies, of the male sex are almost invariably the sequence of a want of co-ordinating power, the result of some disturbing factor in the general nervous system, and are, without almost any exception, curable by means calculated to improve the general health and to restore that confidence in self which often is the sole factor at work in the disorder. Those that affect the female sex are more numerous, and due not entirely, though also often, to nervous debility, but generally dependent on a loss of the general muscular power or on some failure of the general health, the result of scrofula, want of blood, imperfect digestion of food, lack of exercise, to which may often be added a morbid concentration of the mind on one portion of the body, a state directly conducive to local congestion. They are to be met by the resolute adoption of means calculated to improve health and tone and to infuse fresh interest into life.

The organic diseases of both sexes present no features which differentiate them in any very special manner from similar diseases and degenerations attacking other parts of the body, and are to be treated on surgical lines.

APPENDICES.

I. FORMULÆ.

II. HINTS ON DIET.

III. ARRANGEMENT OF THE SICK-ROOM.

APPENDIX No. I.

FORMULÆ.

1. *As a Simple Stomachic and Mild Purgative.*

Trisnitrate of Bismuth	10 grains.
Bicarbonate of Sodium	5 grains.
Powdered Rhubarb	5 to 10 grains.
Oil of Spearmint	1 drop.

To be made into the form of a powder, and to be taken in water, at bedtime, once or twice a week.

2. *For the Reduction of Corpulency.*

Iodide of Potassium	1 drachm.
Caraway-seed Water	6 ounces.

Mix. Take one tablespoonful, in water, on an empty stomach, twice a day for a month or more.

3. *For the Reduction of Corpulency.*

Iodide of Sodium	1 drachm.
Caraway-seed Water	6 ounces.

Dose. As before.

4. *For the Expulsion of Tape-worm.*

A full dose of Castor Oil overnight, to be followed in the morning, two hours before breakfast, by the following mixture:

Extract of Male Fern	80 drops.
Syrup of Ginger	½ an ounce.
Mucilage of Tragacanth	2 ounces.
Water, up to	4 ounces.

If there be any doubt as to the expulsion of the entire worm, it is well to repeat the above process once or twice, at intervals of a week.

5. *A Useful Alterative.*

Iodide of Sodium	1 drachm.
Tartrate of Iron	1 drachm.
Distilled Water	6 ounces.

Mix. One tablespoonful, in water, on an empty stomach, twice or thrice daily.

6. *To Soothe the Stomach in Chronic Gastric Derangement.*

Trisnitrate of Bismuth	1 ounce.
Heavy Carbonate of Magnesium	½ an ounce.

Mix the two powders together.

A teaspoonful in fresh soda water to be taken early in the morning and late at night.

7, 8, 9. *Useful Aperients.*

Powdered Rhubarb Root	2 drachms.
Trisnitrate of Bismuth	2 drachms.
Heavy Carbonate of Magnesium	3 drachms.
Powdered Ginger	1 drachm.

Mix into a powder.

One eighth part at bedtime when the stomach is disordered.

Castor Oil	½ an ounce.
Bicarbonate of Sodium	15 grains.
Peppermint Water, to	4 ounces.

Mix. This makes a purgative draught for an adult. The taste of the oil is well masked by this simple combination.

Or, Castor Oil	½ an ounce.
Mucilage	½ an ounce.
Syrup of Ginger	½ an ounce.
Cinnamon Water, to	4 ounces.

Mix. Same directions.

10. *Castor-Oil Mixture for Diarrhœa.*

Castor Oil	½ an ounce.
Glycerine	½ an ounce.
Spirits of Cajuput	½ an ounce.

Mix. Take a large teaspoonful in a wineglass of thick barley water twice a day.

11. *Salicylic-Acid Treatment of Gall Stone, Gall Sand, or Gall Gravel.*

Salicylic Acid	10 grains.
Powdered Ginger	10 grains.
Sulphate of Potassium	20 grains.
Phosphate of Sodium	20 grains.

Mix. One of such powders to be dissolved in a tumbler of hot water, and to be slowly drunk each morning before breakfast.

12, 13, 14. *Stimulating Hepatic Purges in the Earlier Stages of Fever.*

Salicylate of Sodium	20 grains.
Powdered Rhubarb	5 grains.
Compound Liquorice Powder	30 grains.
Oil of Cajuput	1 drop.

Mix. Such a powder may sometimes with advantage be taken twice a day, by an adult, during the first two or three days of any acute fever.

Or, Each evening, for two or three successive days, a powder consisting of 3 grains of Calomel
may be placed on the tongue, and followed in the morning, by a small teaspoonful of effervescent Citrate of Caffein. The calomel, minus the caffein, in the case of children.

Or, Flexible Cascara and Euonymin Capsules (prepared by Duncan & Flockhart, Princes Street, Edinburgh), one each evening, for three or four nights in succession.

15. *In the Incubation Stage of Fevers.*

Sulpho-carbolate of Sodium	10 grains.

Such a powder to be taken, dissolved in a tumbler of hot water, twice each day, for five or six days.

16, 17, 18. *Ferruginous Tonics in Chlorosis and the Anæmia of persons under forty years of age.*

Tincture of Steel	2 drachms.
Chloride of Ammonium	2 drachms.
Glycerine	1 ounce.
Oil of Lemon	8 drops.
Water, to	2 ounces.

Mix. Dose one teaspoonful in a tumbler of water thrice daily, after eating.

Citrate of Potassium	1 drachm.
Tincture of Steel	64 minims.
Syrup of Lemon	1½ ounce.
Water, to	2 ounces.

Mix. One teaspoonful in a wineglassful of water thrice daily. A useful and agreeable mixture for ladies and children.

Sulphate of Iron	2½ grains.
Carbonate of Potassium	1½ grain.
Sugar	1 grain.
Tragacanth Powder	⅙ of a grain.

Sixty of such pills to be made. Two to be taken three times a day for a month or six weeks.

This last formula is an improvement on the celebrated Bland's pill.

N.B. Other Formulæ are to be found in the text under the diseases for which they are intended as medicinal agents.

APPENDIX No. II.

HINTS ON DIET.

(*a*) Diet in Health.

Both in health and in sickness the appetite and the inclination form the best general guides to a wise dietary, provided that the body be not under the dominance of evil habit.

Hunger and thirst, like the symptoms of disease, are but expressions, appealing to us through our senses by different channels, of that effort which the body of man, like every other substance animate and inanimate, is, in obedience to a universal physical law, compelled to make to maintain an equilibrium, a condition of balance—which in the human body means health—with its surroundings.

In every condition of health and of sickness there is this natural tendency to balance, to health, or to the nearest approach thereto.

We might therefore, it would seem, really leave everything to Nature. This, however, is not so; for in man, not the temporary restoration and maintenance of health, that for which Nature alone provides; but prolongation of life—a providing for a long lease of life—is the great desire of man and the great aim of medicine.

We see, in the victim of ill-habit, the great contrast existing between these efforts of Nature on the one hand and the desire of the human mind on the other.

Thus the body of the habitual drunkard and the gourmand demands abundance of alcohol or a large excess of stimulating food; Nature makes this strange demand, and Nature is acting in strict accord with her laws. Under the altered conditions which these self-indulgents have effected in their bodies stimulants have become necessary for the maintenance of temporary health; ordinary plain food can no longer be digested by them, the stomach requires a

stronger stimulus than this can supply, to the pouring out of digestive fluid; and the nervous system, accustomed also to an artificial life, demands its quota of alcohol. But how disastrous is this course if a long, healthy life be desired! The wise man, in this case, must disregard Nature, for his aims and hers are different. Nature takes no account of the desires of man, but concerns herself solely in the meting out to all matter, living or lifeless, of an equal and universal law.

"Fix upon that course of life which is best, custom will render it the most delightful," is therefore a good motto, provided that the decision as to what is best is arrived at after a mature consideration of *every* side of the question.

For habit, in diet as in all else, allows mankind a latitude; and, I might almost add, enjoins him to take advantage of it. It has enabled him, without decrease of days or loss of health, to change from the gross, occasional repasts of the savage man to the restricted and regular dietary of to-day; and it permits him—in exceptional circumstances commands him—to avail himself of food and of drink more stimulating and more varied than that which his ancestors enjoyed.

Thus it comes about that, provided we exercise our reason in the direction of avoiding gross and injurious excess of food, or food and drink of an obviously over-stimulating nature, we may in health rely on our instincts to guide us to a correct dietary—satisfaction, not gratification, marking the limit in amount.

The following facts are furthermore to be kept in mind.

At no time of life is mere fatness to be viewed as a dietetic success. It indicates rather the reverse: an excess of fuel-foods (fats and starches) and a deficiency, at least a deficient assimilation, of nitrogenous food. Experienced nurses look with suspicion upon a very fat baby, and the insurance offices regard askance their too corpulent seniors. Children brought up at the breast, or judiciously fed with some milky substitute for it, are often much less in weight than those fed on baby foods, rich in starch and sugar, but they possess more stamina and pass the perils of childhood more safely.

From the time that the child commences to feed itself it should be taught *the* dietetic lesson of life: to relish and depend on simple food and to take meals regularly. Then, practically, the only limit to its meals need be its natural desire to stop, for, up to the time that the body ceases growing, it is scarcely wise to place restrictions

on a wholesome appetite. Milk, all the farinacea, nearly all fruits, certainly all fresh ones, and vegetables may be allowed without stint. Up to twelve years of age meat, a stimulating food, should not be given more than once a day, but fish may be allowed in more liberal portions. Sweets and confections are, except in small quantities and at meal-times, bad ; they excite a spurious appetite and reduce the demands of the stomach for the simpler, better, safer foods. In later life, early gratification of the palate bears in many ways evil fruit.

For the vigorous middle period of healthy life there are no set rules. A man's reason and experience will, in a well-ordered mind, be an effective guide, while no mere dietetic restrictions will then suffice to check the individual bent on self-gratification.

In old age, abstinence is the golden rule. History is almost unanimous in its decision that long-livers have been remarkable for abstemiousness. I mention this, inasmuch as it is not uncommon to hear contrary directions given to the aged by their sympathizing friends. Fruits and vegetables may be freely allowed at this period, as also may fuel-foods, farinaceous preparations, and all fats. Indeed, in many of the debilities of the aged, especially in one inveterate form of mental depression, fats, such as cod-liver oil, pancreatic emulsion, cream, etc., will effect much good; but meat, fish, and other highly nitrogenous foods must be partaken of sparingly. The necessity for these latter decreases with age, and the oxidation and final expulsion of the products of oxidation of overmuch albuminous food tax the vital powers of the aged unduly.

(*b*) Diet in Sickness.

First of all, I must remind my readers that the name of any given disease does not represent always the same thing. The saying of Hobbes that "words are the counters of wise men, but the money of fools," applies strongly to the nomenclature of states of ill-health. We, for convenience, group together a number of pathological items, or of symptoms which we have found often to occur together, and dub the group with a generic name, but it must never for a moment be forgotten that the causes of the phenomena witnessed, however similar may be these latter, are often in different cases widely divergent, and that the treatment *must vary as the causes.* Thus dyspepsia, gout, and rheumatism may all be the product of an excess or of a deficiency of food, and the latter disease again may have as

one of its proximate causes a deficiency of exercise or an excess thereof. A bottle of champagne I have known, even in the same individual, at an interval of a few months only, the first time to cause, and the second time to speedily cure, an acute attack of gout in the foot. Indeed, if we except the fevers, almost any disease may spring from opposite causes, in the one individual, and require at each time opposite treatment. For these reasons it behooves us to be extremely chary in our recommendation for special dietaries. The fevers, however, form an exception to this rule, for we know that in all of them an abnormally rapid process of oxidation advances in the body, the stores of food in the blood (albumen), in the liver (animal starch), and in the loose cellular tissues (fat), being speedily used up, and that, concurrently, all the processes of digestion, including those usually spoken of as assimilation, come nearly or completely, according to the severity of the fever, to a standstill. We may therefore safely generalize concerning them as follows.

Diet in Fever.

In fevers, as in all disease, it behooves us to follow our instincts and not the dietetic rules of the books, which are based, necessarily, on an imperfect knowledge of the human body. Nature does not resign her supremacy in disease and give place to some diabolical agent who seeks ever to mislead, through the sensations, the unfortunate sufferer. We have seen that evil habit may, in health, throw the seeker after a long, well-balanced life sometimes off the scent, but this disturbing factor operates with but little force in fever, and we are only too glad to avail ourselves, in such a desperate state of matters, of the time-serving policy of the maintenance, at all risks as to the future, of that temporary balance for which Nature ever works within us. We shall then do well to regulate our fever dietary by the demands of the body, and I may add that, as far as my experience goes, such a course is more successful than any other in the treatment of this class of disorder.

In mild fever of any kind, when the temperature is below 101° F., there will usually remain some desire for solid food, for something a little tasty, but in small quantity. Let this desire be gratified. It is one which we should expect to find present. The stomach, not yet crippled, wants a little whipping up, that it may do its work; let the moderate stimulus that is necessary be forthcoming: ripe but slightly acid fruit, jellies flavored to taste, small quanti-

ties of well-made farinaceous puddings, thin, light soups. Should there be a demand for anything more substantial, it may be supplied, for the digestive capacity is not equally feeble in all cases marked by an equal rise of temperature. Acidulated and cold drinks are often called for, and may be given without stint. Sugar and fats are usually loathed, and, if forced upon the sufferer, rarely fail to produce obvious signs of discomfort.

In cases of fever marked by a higher temperature, it is well to follow the same general rule. As the fever rises the call for solids will vanish, but that for thin, light liquids will increase. Whey, plain or acidulated water, fresh fruits (if demanded), and light fish or meat broths (unthickened) may be given. Milk is not in these cases well digested, the curd which in health as in disease forms in the stomach is generally in fever beyond the digestive capacities and sets up irritation; but there are exceptions, and if there be a desire for milk, it need not be withheld. Tea and coffee are often refreshing to the sufferer. Alcohol may have to be administered, usually rather as a medicine than a food; a wineglassful of white Burgundy or of Rhenish wine, in half a tumbler of aërated water, is usually relished by the patient, and given at intervals of four to six hours is amply sufficient. It is of no use attempting to force the hand of Nature by administering large and oft-repeated doses of alcohol, unless, of course, the object be to tide over merely a few hours of the gravest danger, a crisis, after which we may naturally expect a subsidence of the fever.

Diet in Chronic Gout, Dyspepsia, and Biliousness.

These disorders are not generally marked by any rise of temperature, and it is only to such cases I refer, for if fever be present they must be treated, according to the temperature present, on the lines just laid down. Habit and prejudice often mislead in these, as in all non-febrile attacks. The victims are often immoderate eaters and drinkers—immoderate in relation to their special individual requirements—and behind the functional disturbance which prompts care, the voice of the stomach is still heard calling for its accustomed excess.

The reason and will of the sufferer must here be invoked to our aid. His digestive apparatus has broken down; that is a fact he cannot get over, and a period of self-denial, marked perhaps by many uncomfortable symptoms, must be faced. Free purgation and

the administration of depressing remedies will have the same effect and is the course of treatment often adopted, but it is a bad one. The sufferer has to ask himself what are the special limits within which he can indulge his appetite and thirst; not to judge by his neighbors' capacities. To these limits he must restrict himself in the future, or take the consequences. If an inveterate sinner, or if he be very old or feeble, it may well happen that these limits fall without the line of safe restrictions; then the dietary must be as near the line as is consistent with health, for though an occasional breakdown may be inevitable, yet the interval between each failure will be prolonged.

Diet in Scrofula and in the early stages of Consumption.

The diet in scrofulous states should be a full one, and may with advantage be rich in fats. It is, however, of no use to endeavor to feed up on those lines unless the body be first strengthened so as to be able to avail itself of that which passes down the gullet. I have heard scores of mothers lament that their sickly little ones loathed that which the doctor had so strongly recommended—cod-liver oil, cocoa, etc. Precisely, and the child is right. Remove the sickly one to an air rich in ozone, to a dry, bracing climate, and let it have an abundance of exercise and play; in other words, make room for the fuller diet, supply oxygen to use it, enjoin exercise to remove waste products accumulated in the tissues that check further absorption, and in nine cases out of ten the mother may throw away the cod-liver oil, for the child's appetite for all foods, including even the fats, will be brisk, and it will, moreover, be evident that the foods now find their real billets in the body. You must consider not only your food but the capacities of your sufferer, and if you expect success the two powers must be equalized. It is true that cod-liver oil, being an easily assimilated fat, will sometimes slip into the body when other fats will not, and will thus in appearance, even without change of air, fatten and improve the patient; but all practical physicians know that the fat resulting from it is not "thrifty," vanishing rapidly on the least derangement of the general health. It is thus but a stop-gap, and an indifferent one, in scrofulous and consumptive states.

In the stages of consumption marked by fever it is of no use attempting to feed up; the patient's inclinations may be followed, for as much food will be asked for as is required.

Diet in Diabetes.

I shall not attempt to supply the ordinary list—a long one—of foods suitable and unsuitable in this disease. Such directions may be obtained, gratis, of any vendor of diabetic specialties. They should be closely followed in all cases in which a first-class physician has pronounced the disease to be *real diabetes*. I am compelled to say this, for a vast number of people subject to glucosuria, the mere result of some temporary hepatic disorder, and many aged persons who, as a result of the calcification of the arteries natural to old age, pass by the urine quantities of sugar, are, on very insufficient grounds, put on a strict diabetic régime, only to become infinitely worse by such an unwise and unscientific course.

Diet in Constipation.

To overcome constipation by food it is necessary to consume articles that contain much material that is incapable of digestion and absorption, such material being naturally expelled the body, thus relieving the constipation. Ripe fruit eaten with the skin (in cases in which the skin is edible), as well as figs, oranges, and dates, which contain much that is useless in the strict food sense, are useful in constipation. Porridges and brown bread are, for the same reason, to be recommended.

People who live largely on concentrated foods, such as meat, fish, potatoes, white bread, and farinaceous puddings, must expect to be constipated, for nearly the whole of such food is capable of absorption. It does not follow, of course, that in their cases a small amount of constipation is always an evil, but a certain amount of intestinal activity is necessary, inasmuch as it subserves other purposes besides the onward movement and expulsion of waste actually lying in the bowel.

These brief hints on diet will suffice. To the healthy layman they may seem too short and general to be of use, but the chronic invalid who has really tried treatment by rigid dietetics, as laid down by the books and so-called specialists in diet, will agree with me in thinking that I have said enough. Every man's body and every man's diet are different, and the endeavor to force all mankind, or even all sick mankind, into one of six or seven groups, fails always in practice, however satisfactory it may appear in the pages of a book.

APPENDIX No. III.

ARRANGEMENT OF THE SICK-ROOM.

A room of tolerable dimensions and free as possible from all the noises of the house and the street should be selected. By preference it should have a southern exposure.

Ventilation should be attended to. When a fire is necessary, the fireplace and chimney will act as an efficient ventilator and purifier of the atmosphere, but in summer-time other means, selected according to the needs of the case, must be adopted.

The nurse or other regular attendant should be cheerful and quiet, and possessed of sufficient tact and knowledge to keep the patient comfortable without being fussy.

All preparation of food should be undertaken away from the sick-room.

The bed should, if possible, be of such construction as to permit of the free circulation around it and under it of the air of the room.

A spring bed or a horse-hair mattress, and not a feather bed, should be selected. Unless there be some very special reason to the contrary, the coverings of the bed in all febrile and inflammatory disorders should be light, and if the patient complains of great heat, be even further lightened.

In fine, everything should be done to promote the patient's comfort, to assist his body in the recovery process, and to stimulate his mind by hope.

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